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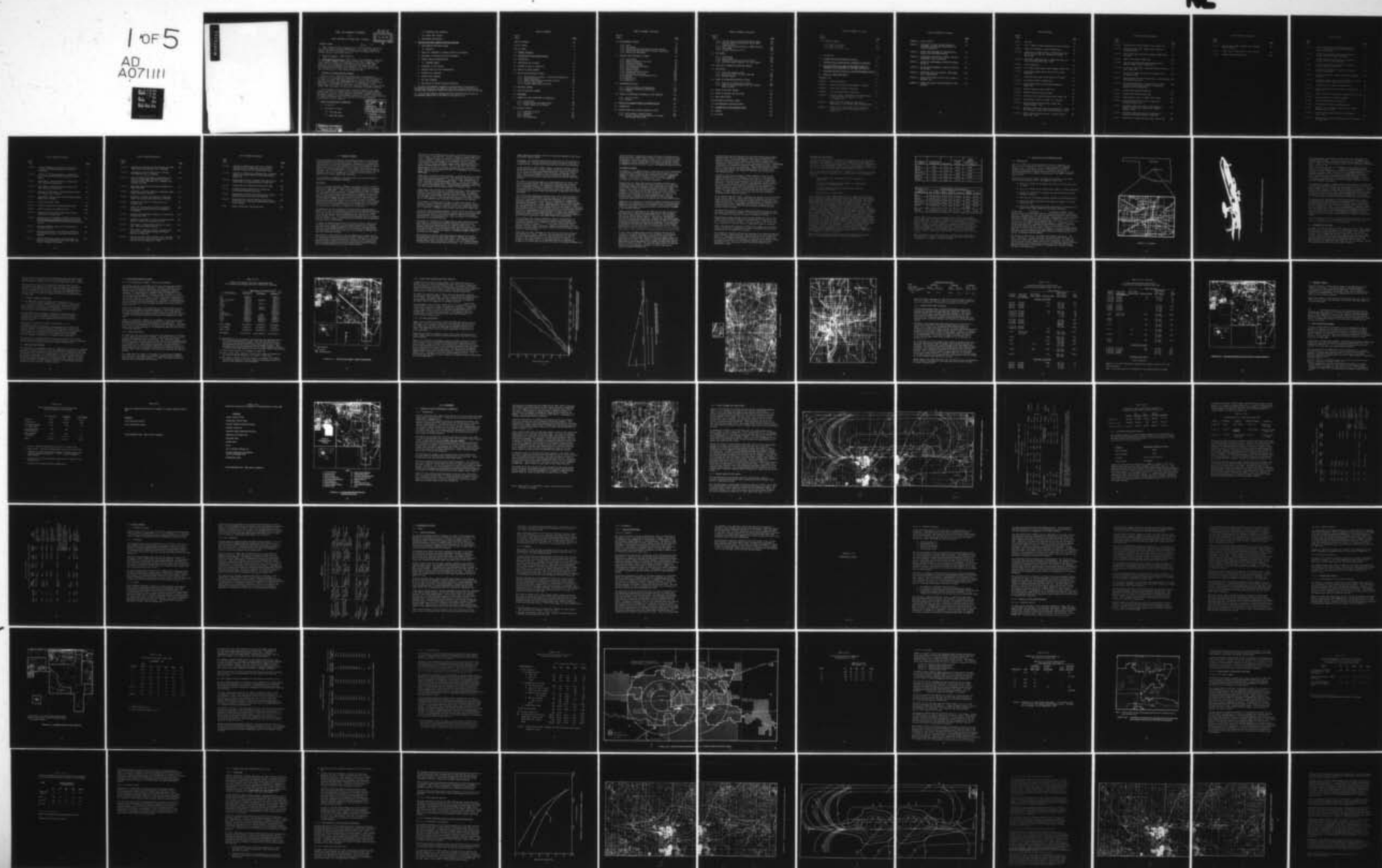

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Environmental Impact Analysis Process

ENVIRONMENTAL IMPACT STATEMENT

DEPARTMENT OF THE AIR FORCE

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FINAL ENVIRONMENTAL STATEMENT

ON

AWACS BEDDOWN AT TINKER AFB, OKLAHOMA

Dec 76

SUMMARY SHEET:

This statement was prepared by the United States Air Force. Dr. Billy Welch, SAF/ILE, Washington, D.C. 20330, Telephone Number 202-697-9297 should be contacted for additional information about the proposed action.

1. Type of Action: Administrative

2. Description of Action: The action is to beddown a new wing of the E-3A, "AWACS," aircraft at Tinker AFB, Oklahoma. The first AWACS aircraft is programmed to arrive in March 1977 with the full complement of 34 aircraft assigned by 1981 assuming timely Congressional approval for their production. The proposed action will also result in the alteration and new construction of facilities at Tinker AFB.

3. Summary of Environmental Impact:

The principal impacts associated with the beddown are related to the operational characteristics of the E-3A aircraft in terms of noise and engine emissions. Noise from aircraft operations ~~in~~ by the 1981 ~~timeframe~~ may contribute to an additional 549 acres of incompatible land use. An additional 7,234 inhabitants and 2,042 housing units may be located in areas around Tinker AFB considered incompatible according to AICUZ criteria.

The increase in air pollutant emissions ~~in~~ by the 1981 ~~timeframe~~ resulting from AWACS will be equivalent to approximately 0.5 percent or less of the regional emissions reported for 1970. Increases impede, to some degree, efforts to control concentrations of these pollutants which are already exceeding standards established for the region.

4. Major Alternatives Considered:

a. No action.

b. Alternative bases.

(1) Hill AFB. Utah

(2) Kelly AFB, Texas

A044 574

109 850

LB

(3) McClellan AFB, California

(4) Robins AFB, Georgia

c. Operational Alternatives

5. Agencies from Which Comments Have Been Received:

a. Environmental Protection Agency

(1) Region VI

b. Region VI, Department of Health, Education and Welfare

c. Department of Housing and Urban Development

d. Federal Aviation Administration

(1) Southwest Region

e. Department of the Interior

f. Oklahoma State and City Clearinghouses

g. Oklahoma City, Oklahoma

h. Midwest City, Oklahoma

i. Del City, Oklahoma

j. Association of Central Oklahoma Governments

6. The Draft Environmental Statement was made available to the Council on Environmental Quality and the public in April 1976, and was followed by an informal public hearing on 25 May 1976, which was attended by over 200 citizens.

7. The Final Environmental Statement was made available to the Council on Environmental Quality and to the public in December 1976.

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1.0 SUMMARY STATEMENT

This environmental statement has been prepared pursuant to the National Environmental Policy Act (NEPA) of 1969. NEPA directs the responsible federal agencies to develop environmental statements in accordance with guidelines set forth by the President's Council on Environmental Quality (CEQ) on all major actions that may have a significant impact on the quality of the human environment. For the purpose of this environmental statement, the U.S. Air Force is the responsible federal agency, and the proposed action is the beddown of a new wing of the E-3A aircraft at Tinker Air Force Base (Tinker AFB), Oklahoma.

The following is a summary of the major points and issues contained in the body of the environmental statement.

The Action

The U.S. Air Force proposes to beddown a new wing of the E-3A, "AWACS," aircraft at Tinker AFB, Oklahoma. The first AWACS aircraft is programmed to arrive in March 1977, with the full complement assigned by October 1981 (a 56-month phase-in period). Although 34 aircraft will be assigned to Tinker AFB, no more than 21 aircraft will be operating in the local area, as many AWACS aircraft will be deployed throughout the world for extended periods. While the present level of aircraft operational activity is assumed to remain constant over the next six years, the AWACS operations at Tinker AFB results in a net daily increase of approximately 8 each of take-offs and landings, and a net increase of 47 "go-arounds" resulting in an estimated net increase of 63 Tinker AFB tower "events" per day (used in this study as a measure of air traffic).

The AWACS will utilize exclusively the north-south runway designated Runway 17/35, with the distribution of take-offs and landings anticipated to be 50 percent over populated Midwest City to the north of Runway 17/35 and 50 percent over the undeveloped area adjacent and to the south of Runway 17/35. This anticipated distribution results principally from the historic record of prevailing wind conditions and corresponding aircraft safety considerations.

In support of AWACS operations will be alteration and new construction of facilities at Tinker AFB. On the basis of current cost estimates, alteration will represent expenditures of $1,700,000 and new construction will represent $25,000,000 for a total expenditure of $26,700,000 All construction of new facilities will occur in areas of the base that have been developed intensely.

Coincidental to the activation of the new AWACS wing at Tinker will be the anticipated construction of military family housing units. Although, for the purpose of this environmental statement, the impact analysis is made based upon a maximum of 200 units, the results of a recently completed housing survey currently being evaluated will probably indicate that the required number of units is actually smaller.

During the 56-month AWACS phase-in period, 3186 military personnel and 326 civilians - totaling 3512 - will be assigned to support AWACS operations. Coincidental with the increase in civilian and military work force in support of AWACS will be the estimated reduction of 1884 civilian personnel now assigned to the Oklahoma City Air Logistics Center (ALC), a Tinker AFB tenant command (other reductions may occur during the AWACS phase-in period). Thus, at the end of the 5-year AWACS phase-in period, the combined military/civilian work force at Tinker AFB will have increased by a net of 774 personnel over its 4th Qtr 1975 level of 21,529

Background

Tinker AFB is located in central Oklahoma, in Oklahoma County and within the Oklahoma City Metropolitan Area. The 2854th Air Base Group is the Tinker AFB command organization. The several tenant organizations include Detachment 507, Tactical Fighter Group (an Air Force Reserve Unit), 3rd Combat Communications Group, 6th Weather Squadron, Communication Computer Programming Center, AFLC Management Engineering Team, and the 1985th Communications Squadron (AFCS), to mention a few.

Tinker AFB is also the home of the Oklahoma City ALC, a large industrial complex with a primary function of supply, maintenance, and repair of aerospace vehicles, engines, equipment and other items. The Oklahoma City ALC was a primary reason for the selection of Tinker AFB to receive the new AWACS wing as it has the necessary facilities to support nearly all of the operational and maintenance requirements of the aircraft.

The presence of Oklahoma City ALC Depot at Tinker AFB accounts for a variety of types of aircraft visiting the base in a "transient" status; transient aircraft comprise a majority of the total flight operations (i.e., take-offs, landings, and go-arounds) experienced at Tinker AFB.

Of the two runways designated Runways 17/35 and 12/30, the former is used over 95% of the time for all take-off, landing, and go-around operations. At the present time the total daily average of take-off and landing operations each is approximately 80. Also, an average of 45 go-around operations are conducted each day.

The majority of departures from Tinker AFB are under Instrument Flight Rule (IFR) in accordance with Standard Instrument Departure (SID), which provides the departing pilot with complete instructions. All landings onto Runway 12/30 are made by visual approach; the ratio of visual approaches to total approaches (visual plus instrument approaches) on Runway 17 (arriving from the north) is 31.2% and 31.8% on Runway 35 (arriving from the south).

The principal air traffic controlling agencies affected by aircraft utilizing Tinker AFB are Tinker Tower Control, Oklahoma City Approach and Departure Control, and Fort Worth Center. On a regional basis, current Tinker traffic accounts for 39.3% of the total "events" handled by Oklahoma City Approach and Departure Control. On a sectional basis,

Tinker departures represent 5.6% of all departures handled by Fort Worth Air Traffic Control Center.

At present, the principal adverse impact perceived by area residents is attributable to aircraft operations at Tinker in terms of noise and, to a lesser extent, accident hazard potential and air pollution emissions.

In the interest of public health, safety, and general welfare, the Air Installation Compatible Use Zone (AICUZ) concept has been developed by the Air Force in order to encourage appropriate control and regulation of the growth and development of the land areas surrounding its air bases. The concept embodies a method of projecting, mapping, and defining aircraft noise and accident hazard areas in terms of compatible land use.

The present and potential impacts of flight operations in terms of the noise and accident hazard zones defined by AICUZ have been evaluated and are being presented to the communities neighboring Tinker AFB in this environmental statement. Comparison of the AICUZ guidelines and the present land use in the Tinker environs shows that some area uses are incompatible with current Tinker AFB operations as measured by the AICUZ methodology.

One school, Steed Elementary in Midwest City, with a 1975 enrollment of 440, is within an incompatible area according to the AICUZ guidelines. Similarly, an estimated 4,730 inhabitants occupying 1507 housing units which are presently within zones (L_{dn} 75) classified as incompatible for residential development and use. Seventeen other schools, three hospitals, and one nursing home are located within Compatible Use Districts (CUDs) (L_{dn} between 65 and 75) in which compatibility for such areas is conditional upon particular levels of noise reduction achieved by the building structure. In addition, approximately 41,436 inhabitants occupy 11,358 housing units within such conditionally compatible areas. No survey was conducted to determine how many and what type buildings now meet the required degree of noise reduction indicated in the AICUZ compatibility guidelines.

At the present time, Federal standards on ambient concentrations of suspended particulates, photochemical oxidants, and hydrocarbons are exceeded in Oklahoma City. Compliance with the Federal standards for these pollutants is expected as a result of emission control measures which are being considered. Ambient concentrations of carbon monoxide, nitrogen oxides, and sulfur oxides are below the Federal standards for these pollutants.

Tinker AFB is a minor contributor to the total air pollutant burden of the Oklahoma City region. Emissions from operations at the base and low-level flight operations over the region constitute less than 3 percent of the total emissions of air pollutants in the region. Air quality at the airbase and in its immediate environs is estimated to be equal to or better than the current air quality in downtown Oklahoma City.

Tinker AFB exerts a significant economic influence in the Oklahoma City Metropolitan area. Annual payroll amounts to nearly 300 million dollars, approximately 245 million dollars of which is paid to civilian employees. In addition to payroll dollars spent in the region, Tinker AFB operates and maintains expenses that amount to over 450 million dollars, of which an estimated 35 million dollars is spent in the greater Oklahoma City area.

Environmental Impacts

The operation of the AWACS aircraft at Tinker AFB will likely cause changes in the existing environment as perceived by area residents. It is the change over present conditions that is emphasized in this environmental statement. Less noticeable changes will occur in terms of Tinker's influence on air traffic, its contribution to area and regional air pollution, and its social and economic influences.

AICUZ contours for Tinker AFB reflecting 1981 AWACS operations were compared with those based upon the present operations. Upon completion of the AWACS beddown, an estimated 11,711 inhabitants will occupy 3,464 housing units in areas considered incompatible according to AICUZ criteria. That portion of the change attributed directly to AWACS is an increase of 7,234 inhabitants and 2042 housing units based on extrapolations of land use data to the 1981 time period. In addition, the East Side School (together with Steed Elementary School) will be located within an incompatible area according to AICUZ guidelines. The accident hazard zone will be the same as that for the present mission.

AWACS will also attribute to an increase in areas considered conditionally compatible to the magnitude of 4,553 inhabitants and 1,736 housing units. Three additional schools will also be located in areas for which compatibility is conditional on particular levels of noise reduction achieved by the building structure.

AICUZ contours were superimposed over 1985 land use plans for Del City and Midwest City. Under the proposed AWACS mission, 43% of Midwest City will be exposed based on projected CUD zones. This represents a 15% increase over the present mission. Additionally, approximately 312 acres of Del City will be exposed. Assuming that the exposed areas develop in accordance with these land use plans, 706 acres of incompatible land use and 5,715 acres of conditionally compatible land use may result as defined by AICUZ Land Use Compatibility Guidelines. This represents an increase of 549 acres and 3,760 acres respectively over the present mission which may be attributed to the AWACS mission. Greater than 90% of these exposed areas are indicated for residential development, some of which is already developed residentially.

In 1981, after the AWACS beddown has been completed, Tinker AFB will continue to be a minor contributor of air pollutants in the Oklahoma City region. Emissions from base activities and low-level flight operations will be less than 3 percent of the total regional burden for each class of pollutant. The increase in emissions resulting from the AWACS beddown will be equivalent to 0.5 percent or less of the regional emissions reported for 1970. The local air quality within the base and its environs will continue to be equal to or better than the air quality in downtown Oklahoma City.

The alteration and new construction of facilities which support AWACS operations will occur in already developed areas of Tinker and will result in short term adverse impacts. These impacts include dust, potential siltation from excavated areas and noise resulting both from construction related traffic and on site construction activity. The proposed construction of a maximum 200 military family housing units will result in the loss of top soil and vegetation. Runoff from impervious surfaces will not significantly increase discharge within the Crutcho Creek drainage basin and will not change the 100-year flood boundaries as they presently exist.

Although in 1981 the net change in Tinker employee population over present levels will be 774 personnel, an increase in the military population will result as the civilian work force will be reduced by 1884, while 3186 military personnel will be assigned to support AWACS operations. Both the Tinker recreation and education service programs will need to be expanded in order to accommodate this increase in military personnel. The Tinker base hospital can accommodate the increased military personnel on a priority basis but may have to reduce service now being afforded to retired persons and their dependents. However, civilian health services in the local area will be able to accommodate these potential patients.

At the present time the schools in Midwest City and Del City are operating at or close to capacity. School aged military dependent children residing at Tinker in the proposed 200 military family housing units would attend these schools. The increase in membership to all Oklahoma County school districts will be dependent upon how many housing units are actually constructed at Tinker and where military personnel residing off-base choose to locate.

Increased sewer and water service demand will depend in large part upon the number of residents at Tinker. In any event the projected increase will be moderate and existing facilities can supply the needs.

The principle economic impacts of the proposed beddown will result from the $25 million military construction program and the proposed $10 million housing construction program. The net increase in the Tinker work force population of 774 will result in commensurate payroll increases.

Energy utilization will increase at Tinker due to AWACS aircraft operations. Aircraft fuel consumption, AGE fuel consumption and electricity consumption are all expected to increase.

Electromagnetic radiation emitted from operation of the AWACS transmitters pose no hazard to ground personnel when the aircraft is in flight above 20,000 ft. Infrequent maintenance checks conducted on the ground will be controlled to insure that personnel are protected from exposure levels exceeding 10 mw/cm^2 which is the maximum personnel exposure levels established by the Occupational Safety and Health Administration, Department of Labor.

Alternatives Considered

Alternative bases were considered for assignment of the new AWACS aircraft. Determination of the best location for the initial beddown of the AWACS aircraft was made considering base intermediate and depot level maintenance capabilities; geographical location for optimum employment/deployment and overall operational effectiveness; cost effectiveness; and, environmental factors.

Bases representing all USAF major commands were initially screened and the majority eliminated due to one or more of the following reasons:

- Lack of depot and intermediate level maintenance capability.

- Location within the US with respect to employment/deployment considerations.

- Cost effectiveness (gross facility deficiencies/excessive MCP cost).

- Environmental consideration.

As a result of the screening, bases in all commands except AFLC were eliminated. These AFLC bases are Hill AFB, Utah; Kelly AFB, Texas; McClellan AFB, California; Robins AFB, Georgia; and, Tinker AFB, Oklahoma. Two factors influenced this decision: (1) Only AFLC bases with an existing depot maintenance mission were considered due to operational readiness enhancement and life-cycle costs of ferrying the AWACS to the depot for maintenance, and (2) There have been identified two separate and distinct computer hardware and software requirements for the AWACS. First, according to the present concept, the main operating base (MOB) will contain the operational software support equipment (i.e., for the mission simulator, flight simulator and the aircraft maintenance mobile trainers). Secondly, AFLC has identified almost identical hardware requirements for systems hardware/software integration which must be carried out at the designated AWACS support Air Logistics Center (ALC). By collocation, only one large scale computer (IBM 360/370 or equivalent), with the peripheral equipment can accommodate both TAC as well as AFLC requirements. $20M in identifiable cost avoidance could be realized over a ten-year period through collocating and optimizing use of existing systems hardware by negating the requirement to purchase and install two identical and comparable computer systems.

The following subjective matrix rating the AFLC bases as good, fair, or poor summarizes the selection considerations:

ALTERNATIVE BASES	MAINTENANCE CAPABILITY	LOCATION	FACILITY COST (APPROX)	DEPOT FACILITY/ EQUIPMENT COST (IN EXCESS)
Hill	Poor	Poor	$45M	$100M
Kelly	Fair	Good	$30M	$ 50M
McClellan	Poor	Poor	$25M	$100M
Robins	Poor	Poor	$29M	$100M
Tinker	Good	Good	$27M	-0-

ALTERNATIVE BASES (CONTINUED)	ENVIRONMENTAL CONSIDERATIONS						
	WEA	AIR TRAF	AIR POLL	AICUZ/ NOISE	HOUSING	WATER/ SEWAGE	SCHOOL
Hill	Fair	Good	Poor	Fair	Good	Good	Poor
Kelly	Good	Good	Poor	Fair	Good	Good	Fair
McClellan	Fair	Good	Poor	Poor	Fair	Good	Good
Robins	Good	Good	Poor	Good	Fair	Fair/ Good	Fair
Tinker	Good	Good	Poor	Fair	Fair	Good	Good

Tinker AFB's selection as the beddown site for the first AWACS operational wing is heavily influenced by its depot level maintenance capability, its central location for deployments to all theaters, and its overall cost effectiveness. In the Air Defense posture Tinker provides an ideal location for launch to all areas of the CONUS. Weather conditions are excellent and airspace suitable for training operations is readily available. The above factors are felt to outweigh the less favorable aspects of the Tinker AFB selection when considering environmental impacts and the facility costs.

The alternative of no action was also examined and considered unacceptable in light of national defense objectives and current obligations to purchase 10 E-3A aircraft.

2.0 DESCRIPTION OF THE PROPOSED ACTION

2.1 INTRODUCTION

The U.S. Air Force has announced plans to locate, or beddown, a new wing of the E-3A aircraft at Tinker Air Force Base (AFB), Oklahoma (Figure 2.1-A). The E-3A, or as it is commonly known, the "AWACS" (Airborne Warning and Control System), is a mobile, fast-moving, versatile surveillance, command, and control center designed to provide battle management in the conduct of air warfare. The AWACS is shown in Figure 2.1-B.

The proposed action will result in changes in conditions in and around Tinker as they presently exist. The proposed action will:

- result in a change in the numbers and types of aircraft operating at Tinker,
- result in a change in the average daily number of flight operations,
- require the utilization of airspace not now affected by aircraft assigned to Tinker,
- alter the use of existing airspace utilized for training purposes,
- change the numbers and types of personnel in support of aircraft operations, and
- require the rehabilitation and new construction of facilities that support AWACS flight operations and support personnel.

Congress has authorized production of AWACS. Three of the aircraft that have been constructed are presently being tested and modified. Subsequently, little data are available relative to the in-flight operational characteristics of this aircraft. Although it is the Air Force's intention to deploy 34 of the AWACS aircraft at Tinker AFB, the annual appropriations from Congress will establish the total number to be included in the Air Force's inventory and subsequently the number of aircraft to be assigned to Tinker AFB. Planning for the beddown at Tinker is, therefore, in the early stages, and many of the aspects of the beddown action described in this section are based on assumptions, which may change rather than fact. For the purposes of the environmental statement, assumptions regarding parameters of the proposed AWACS beddown are conservative so as to project the maximum possible impacts.

The 2854th Air Base Group is the Tinker AFB command organization. The Group, comprised of 12 major divisions, provides services for Tinker, as well as for tenant organizations and off-base activities. The divisions include Security Police, Administration, Civil Engineering, Special Services, Base Operations and Training, Base Services, Base Aircraft Maintenance, Vehicle Transportation, the Chaplain, the Headquarters Squadron Section, Personnel, and Comptrollers.

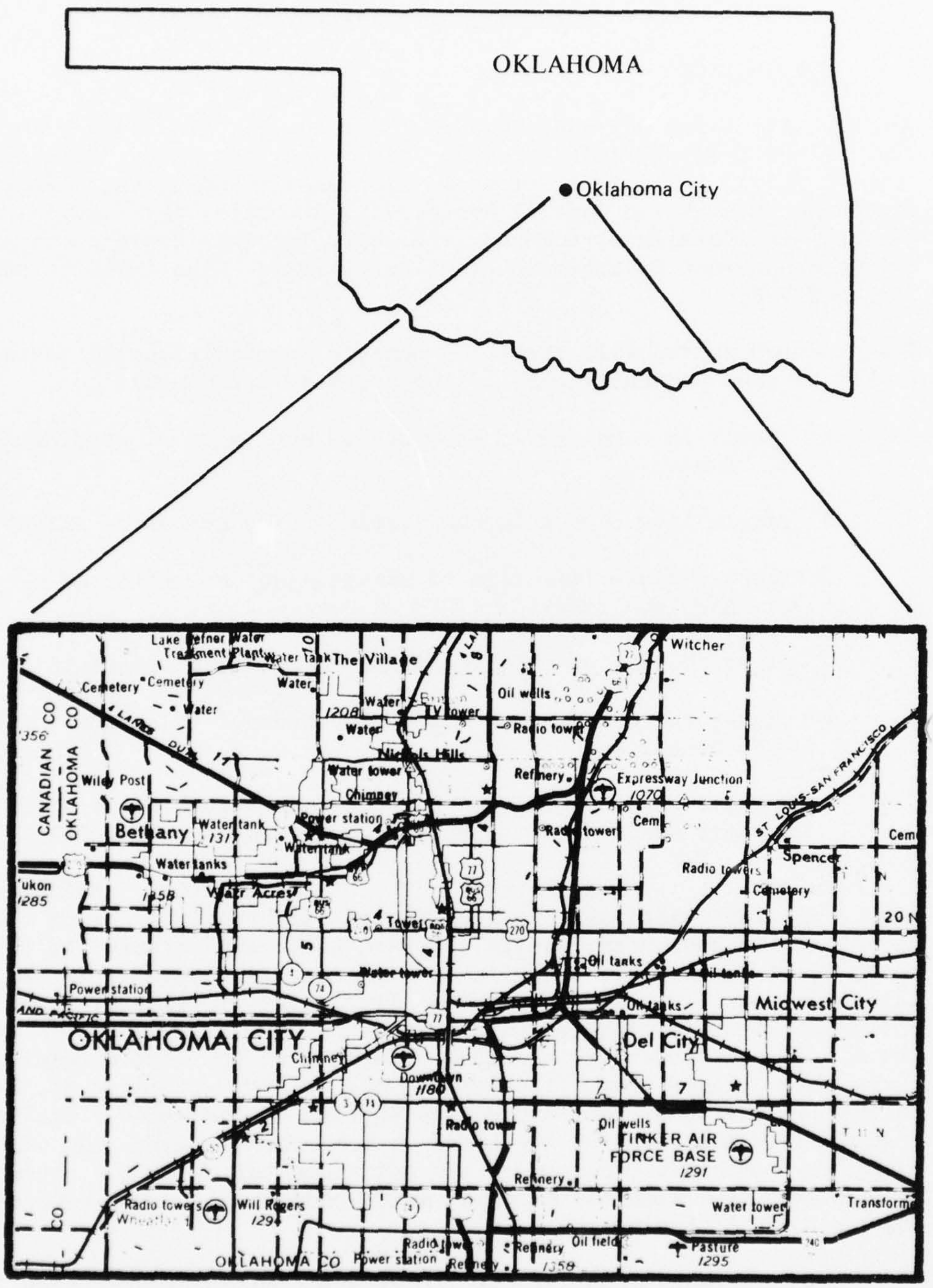


FIGURE 2.1—A AREA MAP

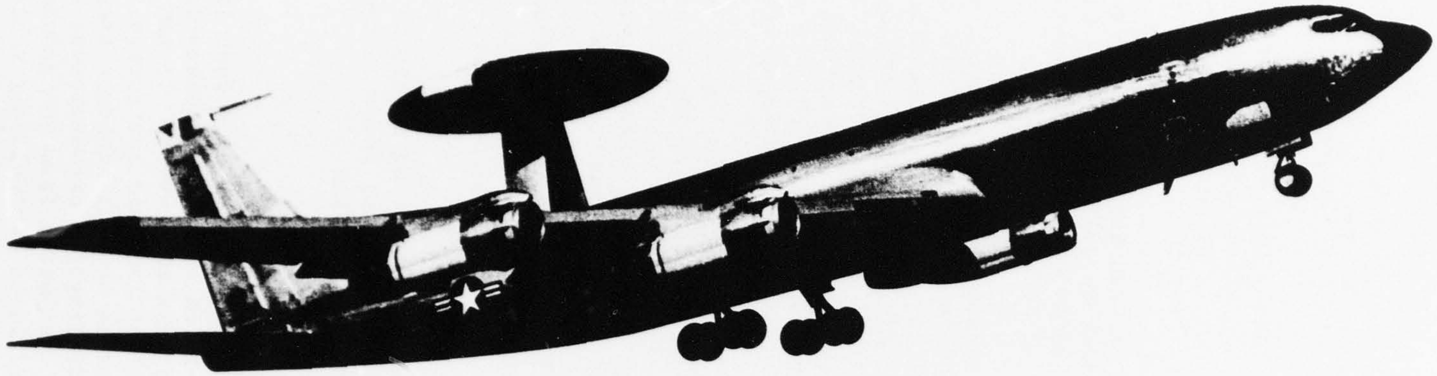


FIGURE 2.1–B   E-3A – "AWACS" AIRBORNE WARNING AND CONTROL SYSTEM

The several tenant organizations at Tinker AFB include Detachment 507, Tactical Fighter Group, an Air Force Reserve Unit, 3rd Combat Communications Group, 6th Weather Squadron, Communications Computer Programming Center, 1985th Communications Squadron (AFCS) and AFLC Management Engineering Team, to mention a few.

Tinker AFB is also the home of the Oklahoma City Air Logistics Center (ALC)--a large (4,200-acre) industrial complex with a primary function of supply, maintenance, and repair of aerospace vehicles, engines, equipment, and other items. As one of five such specialized depots reporting directly to Air Force Logistics Command (AFLC), Oklahoma City ALC has responsibility for providing certain logistics support to Air Force bases in 15 states and in the eastern half of Canada, in addition to worldwide responsibilities for selected aerospace equipment including aircraft, missiles, and engines.

The Oklahoma City ALC was a primary reason for the selection of Tinker AFB to receive the new AWACS aircraft. The ALC has the necessary facilities to support nearly all of the operational requirements of the aircraft. Although AWACS aircraft assigned to Tinker AFB may ultimately be deployed for long periods of time overseas for joint allied tactical exercises and the like, they will all receive major preventative maintenance care and instrument calibration, as well as equipment repairs at Tinker AFB. In addition, the ALC will support the AWACS mission with over 100 depot-level personnel.

The presence of the Oklahoma City ALC at Tinker accounts for a large civilian workforce representing nearly 80 percent of the total civilian and military population assigned to all of Tinker units. The ALC Depot at Tinker also accounts for a variety of types of aircraft visiting the base in a "transient" status. In fact, the movement of transient aircraft and a much lower level of operational activity of assigned aircraft (see Section 2.5.1) account for the principal adverse impacts associated with Tinker's presence in the area. These impacts are related to aircraft operations in terms of noise, engine emissions, air traffic, and accident hazard.

This environmental statement describes the existing physical, social, and economic environment in and around Tinker AFB and those changes that will result from implementation of the proposed action.

2.2 CHARACTERISTICS OF AWACS

The AWACS is a modified Boeing 707-320, topped by a 30 foot radar rotodome that can detect, track, and manage--in an air battle sense--large numbers of aircraft at all altitudes down to tree-top levels. It can also contribute to the command and control of land and sea forces. Previous to AWACS, airborne radar systems looking down at airborne targets flying over the ground, could not readily distinguish between radar energy reflected from such targets and that reflected from the ground. The AWACS provides full long-range surveillance over all air vehicles: manned and unmanned, high and low, over all kinds of terrain.

The aircraft weighs approximately 180,000 pounds empty and 325,000 pounds filled, and has a length of 153 feet and a wing span of 146 feet. AWACS will be manned by a flight crew of four and an operations crew of thirteen.

The noise levels of the E-3A during airport operations have not been established. The engine to be used on the production four-engined E-3A aircraft, the TF-33-PW 100-A, is the same basic engine used currently on the four-engined, C-141 aircraft. Therefore, noise and emission data for the C-141 aircraft have been used for purposes of estimated noise exposure contours and aircraft exhaust emissions for the proposed mission at Tinker AFB.

2.3 MISSION OF AWACS AT TINKER AFB

The new AWACS Wing assigned to Tinker will be under the command of the Tactical Air Command (TAC). The AWACS is a new aircraft to the Air Force's inventory and will become an integral part of TAC's mobile strike force capability. Traditionally, the roles of TAC have been counter-air (air superiority), interdiction, close air support, tactical airlift, and tactical air reconnaissance.

With the AWACS, TAC will greatly strengthen all operational facets of its mobile strike force throughout the world, by use of the AWACS airborne radar with its improved look-down detection and tracking capabilities, computer-aided command and control, and its versatile computer system.

The training syllabus for the AWACS at Tinker AFB is being developed. Training will be concentrated on the development of the theatre control concept made possible by AWACS. Multi-unit exercises including both the air-to-air intercept and the air-to-ground mission are visualized. For the purposes of this study, it is assumed that 30 percent of the total available flying hours will be applied to Air Force Manual 60-1 type training, with the residual to be applied to the theatre control exercises.

The duration of an average mission or sortie (a round trip) will be about 8 hours and can be as short as 4 hours. Exercises will be joint and unilateral with some training conducted with the Air Defense Command (ADCOM).

2.4 PHASING OF AWACS BEDDOWN

The first AWACS is programmed to arrive in March 1977, with the full complement of assigned aircraft in operation by October 1981 (a 56-month phase-in period). Although a possible maximum of 34 AWACS aircraft will be assigned to Tinker AFB, no more than 21 of these will be operating out of the base at any given time. For purposes of analysis, it is assumed that the current schedule of aircraft operations at Tinker AFB will also be in effect in 1981. Thus, for purposes of this environmental statement, the assumption has been made that the 1981 aircraft operations at Tinker AFB will include all of the present activities in addition to the operations of AWACS aircraft.

2.5 ANTICIPATED OPERATION OF AWACS

2.5.1 AIR OPERATIONS AT TINKER - ARRIVALS AND DEPARTURES

Operational activity of the AWACS aircraft now utilizing Tinker AFB has been broken down into three categories: take-offs, landings, and go-arounds. For the purpose of this study, the "go-around" category is broadly defined as touch-and-go and repetitive instrument approach maneuvers. A touch-and-go is a combined landing and take-off in that the aircraft is only slowed to the point at which satisfactory control on the runway has been achieved. The pilot then quickly reconfigures the aircraft for take-off (i.e., flaps, control surface trim, drag devices, etc.) and proceeds with a normal take-off. Instrument low approaches are similar; however, aircraft touchdown is not permitted. In both maneuvers the aircraft typically flies box-shaped patterns such as that shown in Figure 2.5.4-B.

Flight Track 17J shown in the figure will be used by the AWACS aircraft only in the performance of go-around maneuvers. Seventy-five percent of all AWACS operations will conform to Flight Track 17J. Take-offs and landings of the AWACS and other aircraft utilizing Tinker AFB will conform to Flight Track patterns introduced in Section 3 and Appendix B of this study.

Table 2.5.1-A presents a summary of the schedule of present and proposed landings, take-offs and touch-and-go operations at Tinker AFB. A more detailed discussion is presented in Section 3.1 and Appendix B. As shown in the table, the introduction of 21 AWACS aircraft by October of 1981 will result in a net daily increase of 7.8 landings and take-offs each and 46.9 touch-and-go maneuvers.

2.5.2 RUNWAY UTILIZATION

The AWACS will take off and land using the runway designated 17/35 (Figure 2.5.2-A), which is 11,100 feet in length. Approximately 95 percent of all take-offs and landings occur on this runway. The alternative runway, designated 12/30 is used five percent of the time, and all landings are made by visual approach. Several factors dictate the continued disproportionate use of Runway 17/35: prevailing wind conditions; the availability of navigational aids for the instrument approach and landings (as opposed to visual approach); and the presence of bidirectional arresting gear and jet barriers, which reduce the danger of an aircraft overshooting the runway on landing.

The traffic split for Runway 17 and Runway 35 is approximately 50%/50% (i.e. 50% of the total number of take offs, landings, and go-arounds are made on Runway 17 and 50% on Runway 35). Runway utilization is dictated primarily by the prevailing wind direction.

Table 2.5.1-A

Present and Proposed (June 1981) Operational Data
For Transient and Assigned Aircraft at Tinker AFB, Oklahoma

Aircraft (2)	Operations Per Year/Per Day (1)		
	Takeoffs (3)	Go-Arounds	Landings (3)
A-4	1196/4.6		1196/4.6
A-7	910/3.5		910/3.5
Other "A" Series	676/2.6	4082/15.7	676/2.6
B707-C135	936/3.6		936/3.6
B-52	260/1.0	234/.9	260/1.0
C/DC-9	1742/6.7		1742/6.7
C-141	1248/4.8	624/2.4	1248/4.8
C-5	260/1.0	156/0.6	260/1.0
F-4	1508/5.8		1508/5.8
F-105	4160/16.0		4160/16.0
L-188/L382)	2074/8.0	-0/0-	2074/8.0
Other F Series	962/3.7	1326/5.1	962/3.7
C-130	1696/6.5	1118/4.3	1696/6.5
T-38	2782/10.7	3016/11.6	2782/10.7
T-39	1716/6.6	1742/6.7	1716/6.6
TOTAL PRESENT	22,126/85.1	12,298/47.3	22,126/85.1
E-3A (AWACS)	2,033/7.8	12,194/46.9	2,033/7.8
TOTAL (1981)	24,159/92.9	24,492/94.2	24,159/92.9
NET CHANGE	(+)2,033/7.8	(+)12,194/46.9	(+)2,033/7.8

(1) Operations per day are based on operations per year divided equally into 260 operational days per year. This does not imply that no operations occur during the weekend; in fact, traffic data indicate that weekend activity is almost as high as weekday activity. The assumption that all yearly operations occur during weekdays provides a conservatively high estimate for noise and tower capacity calculations.

(2) Some of these aircraft are assigned to Tinker AFB.

(3) Later in this study, the term "sortie" will be used in reference to one take-off and one landing or, in effect, a round trip.

(4) Net change is based on full operations of 21 assigned E-3A (AWACS) aircraft (See Section 4.3) and no change in operational activity of other aircraft presently utilizing Tinker.

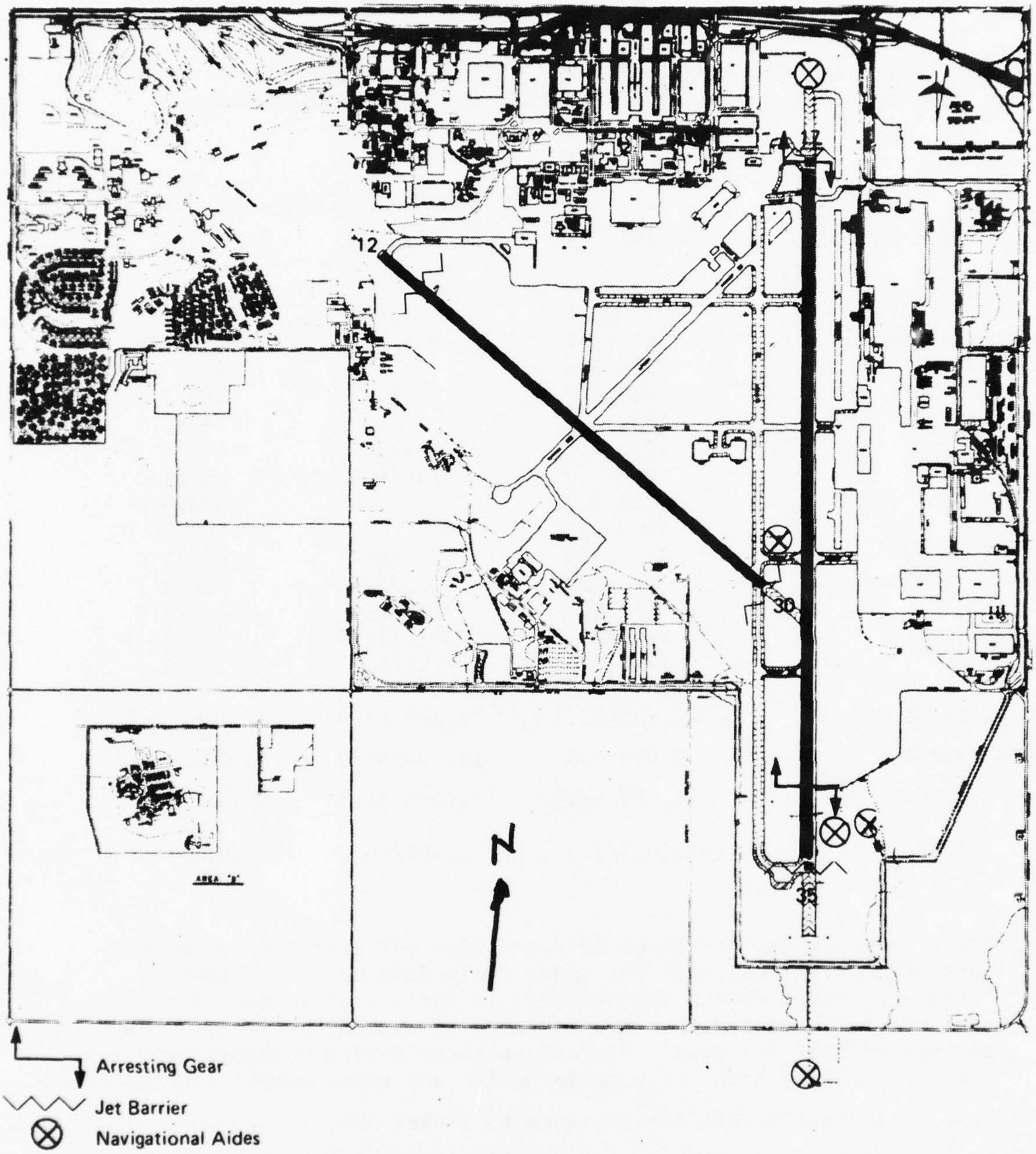


FIGURE 2.5.2--A TINKER AFB, OKLAHOMA – RUNWAY DESIGNATIONS

2.5.3 FLIGHT TRACK PATTERNS AND FLIGHT PROFILES

Of AWACS aircraft taking off and landing, 50 percent will pass over Midwest City to the north of Runway 17/35, with 50 percent passing over the area adjacent to and south of Runway 17/35. This results principally from prevailing wind conditions and corresponding aircraft safety conditions. Figure 2.5.3-A compares the flight profile of the AWACS during take-off with profiles of selected aircraft currently utilizing Tinker AFB.

The AWACS will generally land at Tinker AFB using instrument approaches as opposed to visual approaches. Figure 2.5.3-B depicts the landing profile for the AWACS. The glide slope, the angle formed by the intersectional line extending horizontally from the runway with the line of flight of the AWACS, will be 2.5 degrees for instrument approach. From a point at approximately 1320 feet above ground level at 5 nautical miles (30,400 feet) from the end of the runway, the AWACS will descend at a steady rate to the runway threshold. By way of comparison, a substantial portion of current Tinker traffic utilizes a visual type approach which may be accomplished at a much steeper glide slope. For example, fighter type aircraft typically have a 5.8% descending slope when landing out of a 360° overhead landing pattern.

2.5.4 AIR SPACE REQUIREMENTS

Figure 2.5.4-A defines the areas in which the AWACS will operate local to Tinker AFB. These include the External Stores Jettison Area, Functional Jet Flight Area, Instrument Training Area, and Emergency Bailout Area. Since these areas are currently being used by aircraft operating out of Tinker, the AWACS mission will not require additional air space in the local flight area.

Eventually the AWACS will operate in many areas of the continental United States (CONUS) and will possibly be deployed throughout the world for joint allied exercises.

Figure 2.5.4-B depicts a rectangular flight track pattern (Track 17J) which will be used by the E -3A aircraft when making practice approaches and/or touch and goes. Track 17J calls for left-hand turns. When the wind is out of the north and Runway 35 is the tower designated landing runway, the AWACS will use Track 35J (not shown), which calls for right (turns) rectangular traffic patterns for repetitive approaches. Both flight patterns describe roughly similar tracts over the ground; however, the direction of traffic is opposite (i.e., clockwise for 35J and counter-clockwise for 17J). It is anticipated that the AWACS aircraft operations at Tinker AFB will be distributed in the following manner:

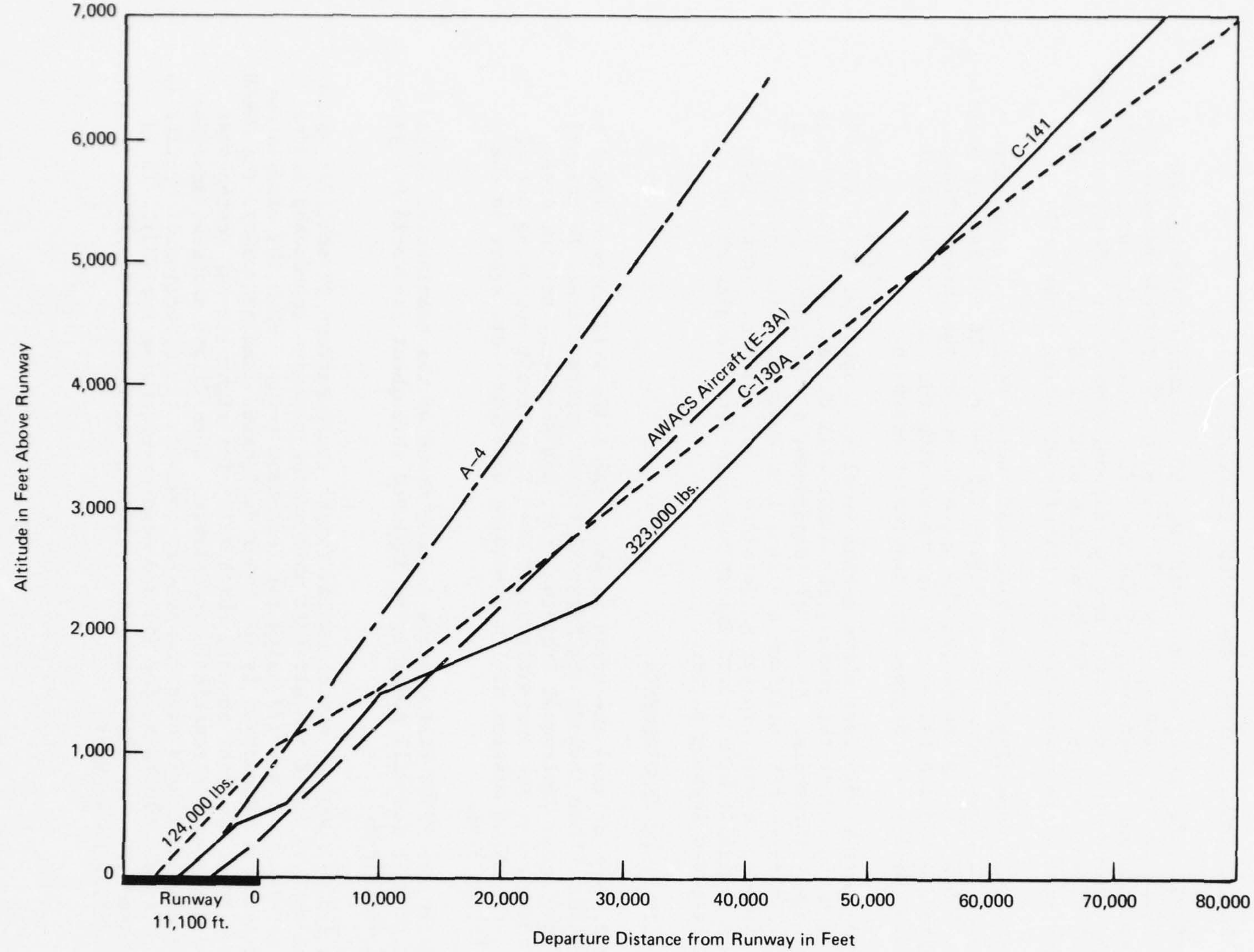
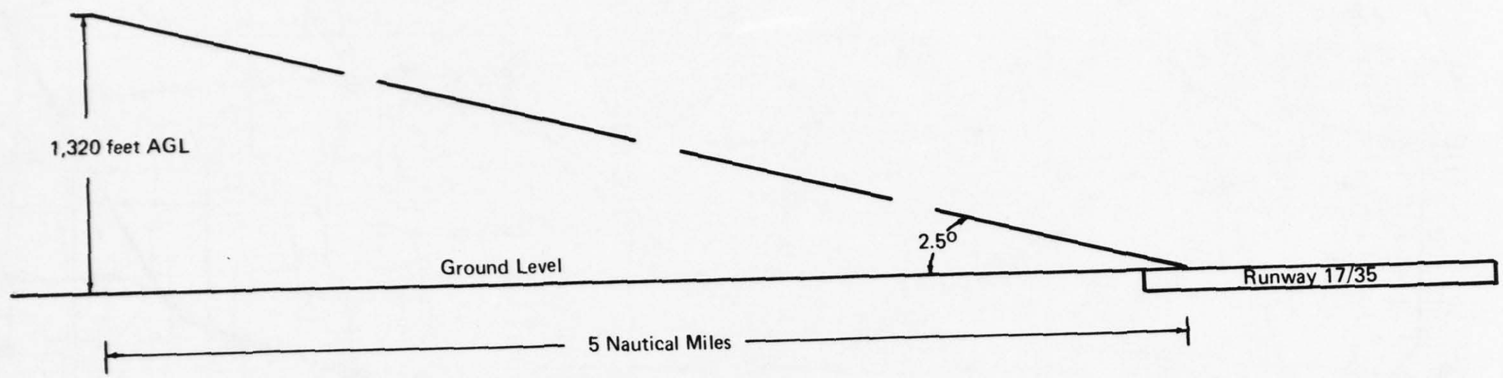


FIGURE 2.5.3–A COMPARISON OF FLIGHT PROFILE OF AWACS DURING TAKE-OFF TO SELECTED AIRCRAFT CURRENTLY UTILIZING TINKER AFB



Note: Flight profile is identical for either Runway 17 or Runway 35.

FIGURE 2.5.3–B INSTRUMENT LANDING PROFILE FOR AWACS AND OTHER AIRCRAFT UTILIZING TINKER AFB – 1981

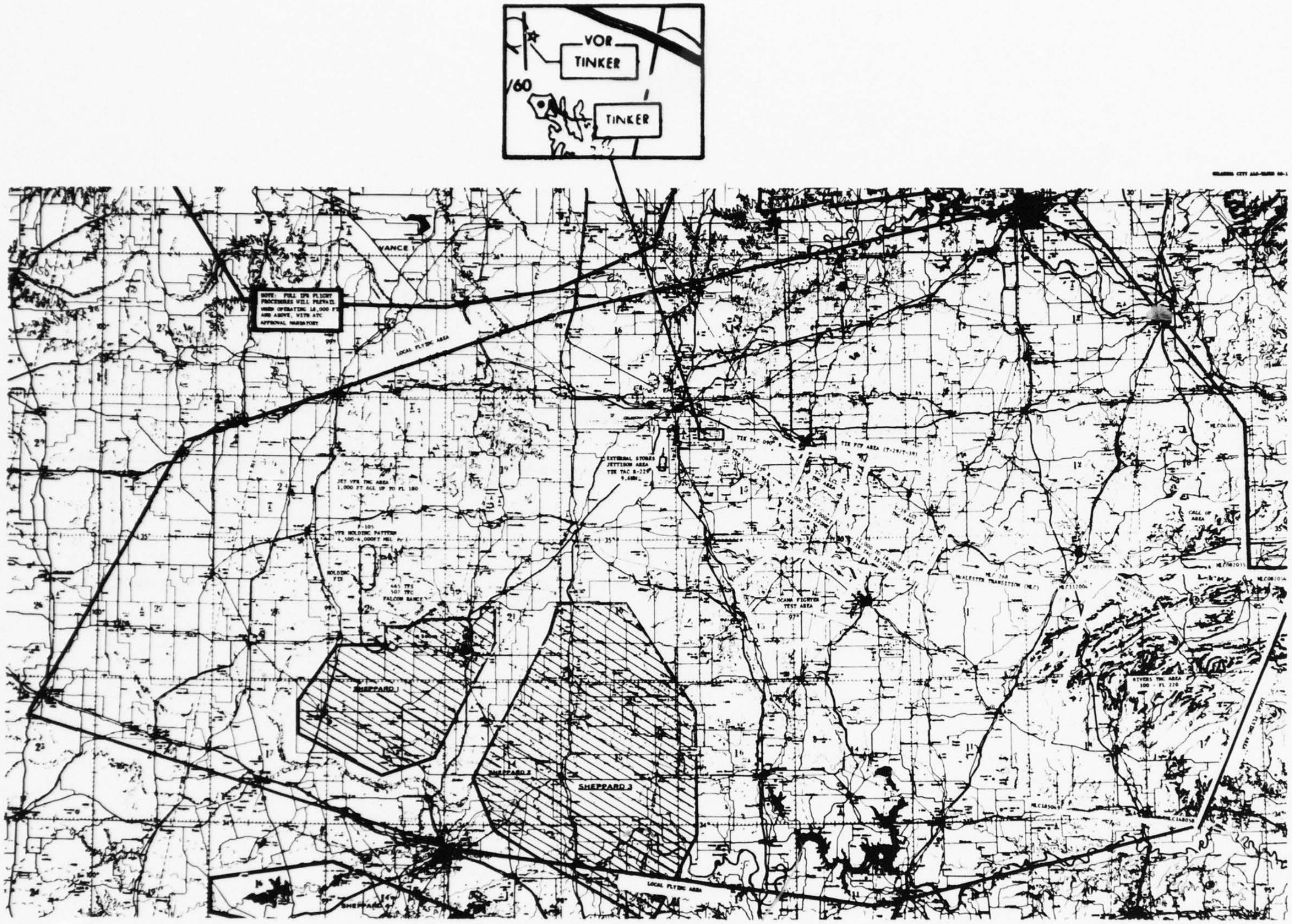


FIGURE 2.5.4–A LOCAL FLYING AREA

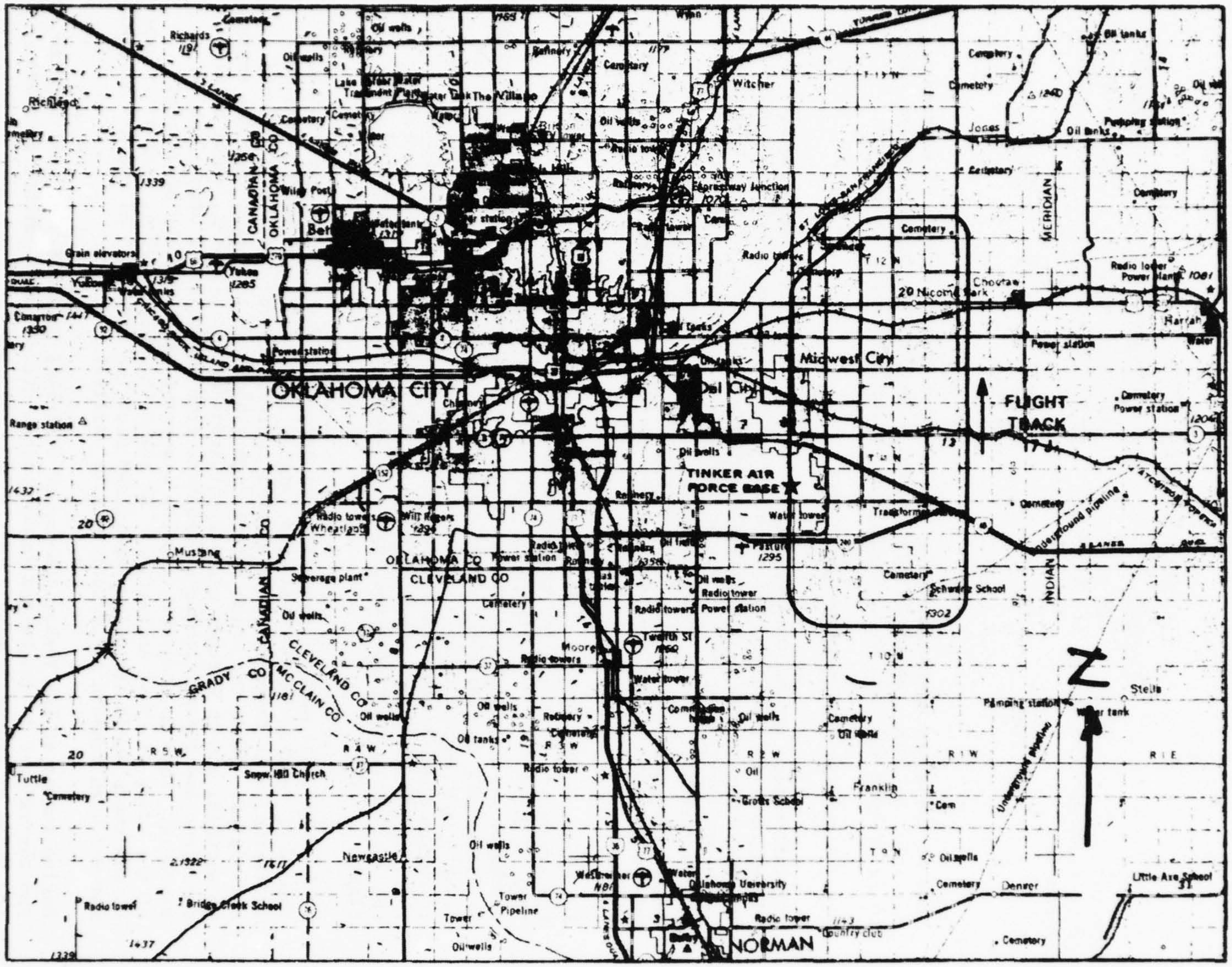


FIGURE 2.5.4–B 17 J FLIGHT TRACK PATTERN USED BY AWACS, TINKER AFB

Average Daily Operations

Total	Take-Offs		Landings		Go Arounds	
Tower Events (take-offs, landings and go-arounds)	RW 35 (to North)	RW 17 (to South)	RW 35 (from S)	RW 17 (from N)	RW 35 (to N)	RW 17 (to S)
62.5	3.08	4.74	3.08	4.74	18.3	28.5

Some of the above operations will take place during the hours of darkness, but prior to 10PM. An AWACS will arrive or depart from Tinker between the hours of 10PM and 7AM, on an average of approximately once a week.

2.5.5 AIRCRAFT ENGINE RUNUP ACTIVITIES

Aircraft engine ground runups, utilized for maintenance, power check, and engine trim purposes, are the other major operational acitivity of interest from the noise and exhaust emission viewpoints. Such runups, which are carried out at various engine power settings and for various time durations, include those conducted on the engines alone at the engine test cell facilities, and those conducted at the various test pads, or runup areas, at various locations on the base for the aircraft-intalled engines.

Estimates of the average daily engine runup activity at Tinker AFB for the present mission and for the proposed AWACS mission are given in Table 2.5.5-A. Since, with the exception of the E-3A aircraft, the operation of transient and assigned aircraft and engine maintenance activities at Tinker AFB is expected to remain constant (Table 2.5.1-A) it is likewise assumed that engine runup activity will not change. Therefore, the increase in engine runup activities by 1981 is assumed to be wholly attributable to the AWACS beddown. The locations of runups on the base for each of the aircraft and engine types, given on Table 2.5.5-A, is indicated on Figure 2.5.5-A.

It is noted that most of the current runup activity is during daytime hours. The AWACS runups will be conducted mainly during daytime hours, and, as indicated, will represent only a small increase in the total engine runup activities. Since the noise output from ground runups varies from one engine to another, and on whether noise suppresion devices are used, these total durations are not particularly important from the point of view of noise exposure. They do, however, provide a general basis for the assessment of the scope of these activities. As noted in Table 2.5.5-A, aircraft runups at the runup areas are all unsuppressed with the exception of the A-7 aircraft, for which an exhaust suppressor unit is utilized.

Engine runups at the Tinker AFB engine test-cell facilities are all suppressed, and the exhaust is discharged in a vertical direction to further decrease the noise at ground levels.

Table 2.5.5-A

Average Runup Duration (Seconds/Day)
Present Mission and AWACS Mission (June 1981)

Aircraft Engine	Runup Area & Heading (true bearing)	Power Setting: Afterburner (Max. Power)	Military Power	Intermediate Power (% of Mil. Power)	Idle Power
		DAYTIME (0701-2200)			
B52/J57	R3/180°		4152	528 (75)	1261
B52/J57	R3/180°			341 (85)	
B52/J57	R3/360°		1171	108 (75)	321
B52/J57	R3/360°			82 (85)	
C-135/J57	R1/180°		173	1296 (75)	259
C-135/J57	R1/360°		43	324 (75)	65
C-135/J57	R4/180°			3 (75)	120
C-135/J57	R4/360°			1 (75)	30
A-7/TF41	R3/270°			700 (75)	2492
A-7/TF41	R3/270°			233 (85)	
A-7/TF41	R2/180°*			700 (75) 233(85)	2492
F-105/J75	R5/270°			396 (80)	1848
F-105/J75	R1/360°	75	225		45
-/J57	T2/Vertical Test Cell		9608	3952 (75) 3786 (NR)**	12,023
-/TF41	"		5198	3836 (75) 3772 (NR)	7404
-/J75	"		3071	768 (75) 424 (NR)	2091
-/J79	"	433	2330	373 (75) 807 (NR)	2785
-/TF30	"	1850	8821	1402 (75) 2569 (NR)	3913
-/TF33	"		7217	3082 (75) 2029 (NR)	6916
		NIGHTTIME (2201-0700)			
B52/J57	R3/180°		2433	168 (75)	84
B52/J57	R3/180°			87 (85)	
B52/J57	R3/360°		692	62 (75)	10
B52/J57	R3/360°			34 (85)	

Table 2.5.5-A Continued

Average Runup Duration (Seconds/Day)
Present Mission and AWACS Mission (June 1981)

Aircraft Engine	Runup Area & Heading (True bearing)	Power Setting: Afterburner (Max. Power)	Military Power	Intermediate Power (% of Mil. Power)	Idle Power
C135/J57	R1/180°		43	324 (75)	65
C135/J57	R1/360°		11	81 (75)	16
C135/J57	R4/180°			1 (75)	30
C135/J57	R4/360°				8
A7/TF41	R3/270°			233 (75)	1246
A7/TF41	R3/270°			77 (85)	
A7/TF41	R2/180°*			233 (75)	1246
A7/TF41	R2/180°*			77 (85)	
-/J57	T2/Vertical		1281	505 (NR)	1601
-/J57	Test Cell			527 (75)	
-/TF41	"		692	502 (NR)	986
-/TF41	"			510 (75)	
-/J75	"		409	56 (NR)	279
	"			102 (75)	
-/J79	"	58	310	107 (NR)	371
	"			50 (75)	
-/TF30	"	247	1176	342 (NR)	522
	"			187 (75)	
-/TF33	"		962	271 (NR)	922
-/TF33	"			411 (75)	
		DAYTIME (0701-2200)			
E-3A/TF33	TP-1/180°		268	134 (87)	404
E-3A/TF33	TP-2/360°		176	88 (87)	262
E-3A/TF33	R6/180°			943 (87)	1571
E-3A/TF33	R7/360°			857 (87)	1429
		NIGHTTIME (2201-0700)			
		(None Scheduled)			

*Model No. A/F 32A-19 Suppressor, with Vertical Exhaust, used for A-7 at R2.

**Normal Rating.

Note: E-3A runup activity is estimated for the proposed mission in 1981.

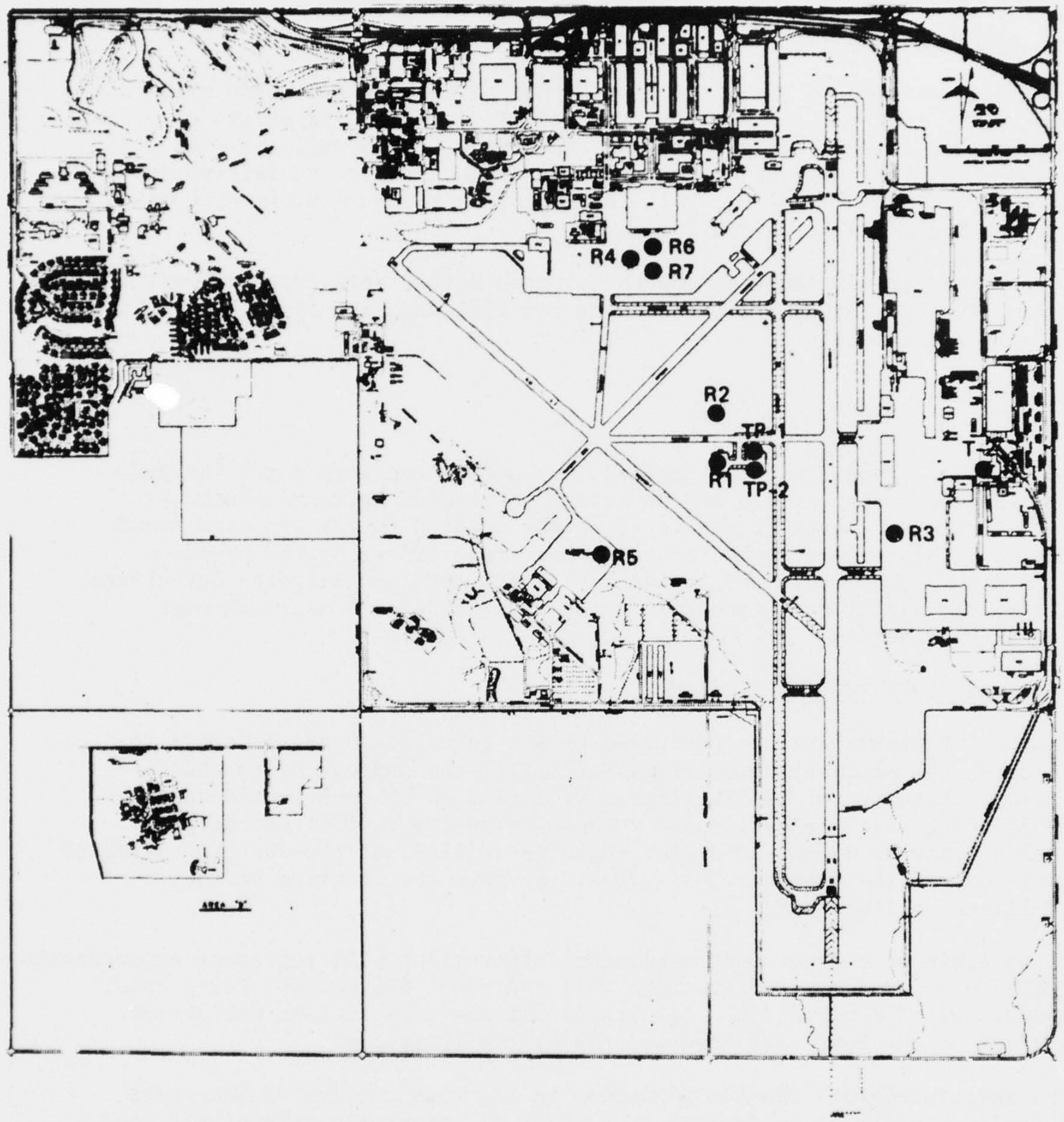


FIGURE 2.5.5-A LOCATIONS OF ENGINE RUN-UP AND TEST CELL AREAS, TINKER AFB

2.6 PERSONNEL SUMMARY

Personnel assigned to Tinker AFB in support of the AWACS mission will number 3512.* Of these, 3077 military and 39 civilians (primarily secretaries) will be assigned to the AWACS Wing. An additional 396 personnel will be assigned to other units at the base as administrative support for the AWACS mission; it is assumed that 109 of these will be military and 287 will be civilian.

Table 2.6-A presents current and anticipated future work force figures for Tinker AFB; the latter are projections for 1981 when the AWACS Wing will be fully operational.

The anticipated reduction in the civilian work force the ALC occurring over this period is the result of general personnel cutbacks by the Defense Department and is in no way related to the proposed AWACS mission. This reduction is, however, more than offset by the proposed AWACS mission; as indicated in the table, the total anticipated net change will be 774 additional personnel in the work force at Tinker AFB over the six-year period.

2.7 AWACS CONSTRUCTION PROGRAM

A survey of Tinker AFB was performed by Air Force personnel in order to determine the adequacy of existing facilities for support of the AWACS mission. A number of new facilities will need to be constructed and a few existing facilties will need to be altered for support of the AWACS mission. Tables 2.7-A and B list these facilities and provide the estimated total cost of the projects. Figure 2.7-A shows the location of these facilities on Tinker AFB.

On the basis of current cost estimates, alterations will represent expenditures of $1,700,000 and new construction will represent $25,000,000 for a total expenditure of $26,700,000 All new facilities construction will occur in areas of the base that have been developed intensely.

Also associated with the AWACS mission is the construction of 200 units of family housing to be located on a tract of previously undeveloped land adjacent to existing family housing.** The total cost of this family housing is $10,000,000 bringing the total cost of AWACS-associated construction activities to $36,700,000.

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*Sources: USAF Unit Authorization File as of 31 July 1976 and Air Force Military Authorization Voucher (AFMAV) 76-4.

**Housing requirements are being reassessed as the result of a housing survey conducted in June 1976. The outcome of this evaluation will determine the actual number of units built, if any. This environmental statement has assumed that the maximum possible number of units will be built.

Table 2.6-A

Present and Anticipated Proposed Civilian and Military Workforce at Tinker AFB

	4th Qtr 1975[1]	Proposed[2]	Net Change
Military	3013	5572[3]	+2559
Civilian ALC	17,581	15,697[4]	-1884
Civilians assigned to other units	467	566[5]	+ 99
Non-Appropriated Fund Personnel	327	327	0
Base Exchange Personnel	141	141	0
TOTAL	21,529	22,303	+774

1. Source: USAF Unit Authorization File as of 31 March 1975.
2. 1981 (Source: USAF Unit Authorization File as of 31 July 1976).
3. Includes 3077 military personnel assigned to AWACS Wing and 109 military personnel assigned to AFLC units in support of AWACS mission.
4. Includes 287 civilians assigned to AFLC units in support of the AWACS mission.
5. Includes 39 civilians assigned to AWACS Wing.

Table 2.7-A

Facilities Requiring Alteration for Support of Proposed Mission, Tinker AFB.

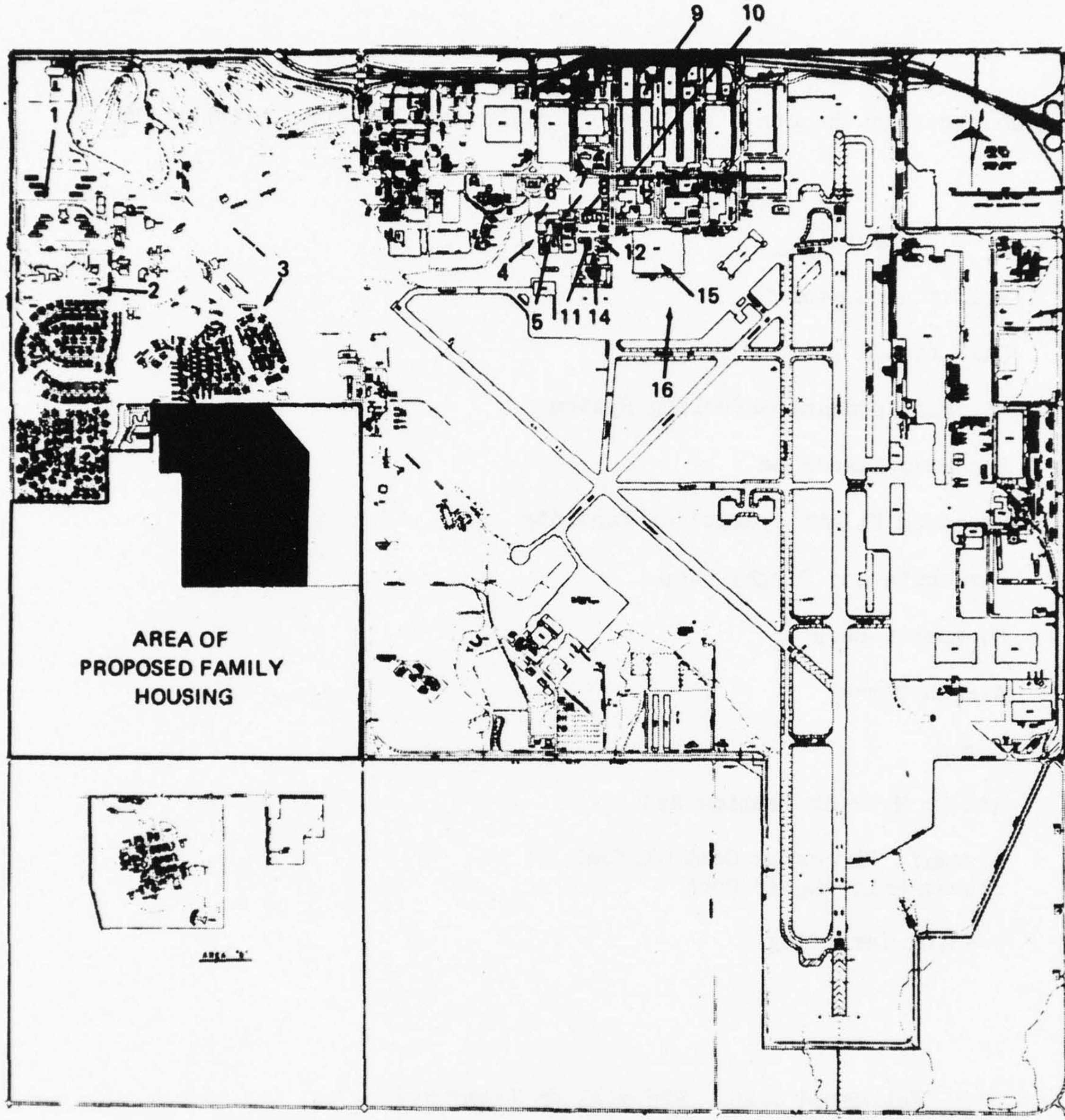
Facility
Field Training Facility
Alter Maintenance Hangar

Total Estimated Cost: $1.7 million (approx.)

Table 2.7-B
Construction Required for Support of Proposed Mission, Tinker AFB

Facility
Flight Simulator Tng
Operational Mission Trng
Aircraft Hydrant Refueling System
Academic Classroom
Squadron Flight Operations Facility
Parachute and Dinghy Shop
Equipment Shop
Airmen Dorms
Apron
Add to Hydrant Fueling Sys
Aircraft Corrosion Control/Fuel System Maintenance Dock
Headquarters Wing

Total Estimated Cost: $25 million (approx.)



Legend

1. Airmen Dormitories
2. Education Center
3. Officer's Quarters
4. Hydrant Fueling System
5. Automotive Maintenance Shop
6. Wing Headquarters
7. Squadron Operations
8. Operational Mission Training
9. Equipment Shop
10. Parachute and Dinghy Shop
11. Flight Simulator Facility
12. Fuel Systems Maintainance Dock Covered Aircraft Wash Rock
13. Academic Classroom
14. Age Shop
15. Field Training Facility and Aircraft General Purpose Shop
16. Apron

FIGURE 2.7–A ALTERATIONS AND CONSTRUCTION REQUIRED FOR AWACS

3.0 BACKGROUND

3.1 SUMMARY OF FLIGHT OPERATIONS AT TINKER AFB

3.1.1 INTRODUCTION

Aircraft utilizing Tinker AFB fly into and out of the area using established flight patterns and procedures. Deviation may be required in the event of emergencies. **However, as a** rule, aircraft fly in the area according to established procedures, and maintain communication with ground control for instructions or authorizations to make maneuvers. Air traffic controls at the various local civilian and military airports in turn are in constant communication with one another to ensure traffic flow coordination, such as the maintenance of undirectional flow as contrasted with the undesirable counter flow of air traffic in regions such as the Oklahoma City Metropolitan area, in which there are several airports.

The high level of operational activity experienced at Tinker (see Table 2.5.1-A) is attributable, for the most part, to "transient" status aircraft. Tinker is surrounded by military **bases, and some traffic** is attributable to non-terminating approaches by training type aircraft. The presence of Oklahoma City ALC attracts aircraft from all over the United States for repair, outfitting, and flight testing. Daily LOGAIR flights carry freight to approximately 60 Air Force activities and connect with aerial ports for worldwide distribution. Flight operations subsequently fall into several categories.

Two procedures are common to all categories and to both military and civilian traffic controlled and/or monitored by FAA facilities: Visual Flight Rules (VFR) and Instrument Flight Rules (IFR).

VFR service provides pilots with only limited assistance. The VFR pilot may file a flight plan identifying his route of flight, time enroute, and destination airport. He can avail himself of traffic and weather advisories enroute. He may fly on or off airways in his point-to-point flights. In either case, procedures are established for selecting altitudes according to direction of flight affording some protection against other traffic.

Under IFR, FAA provides positive separation from all other IFR traffic. Air Force policy dictates that all flight operations be conducted according to instrument flight rules to the maximum extent practical. Consequently, most flights out of Tinker will proceed to and from the base under well defined flight tracks (see Appendix B).

The majority* of departures from Tinker AFB are under IFR in accordance with Standard Instrument Departure (SID), which provides the departing pilot with complete instructions (even in the event of radio failure). The ratio of VFR arrivals to total arrivals is 31.2% for Runway 17 (arriving from the north) and 31.8% for Runway 35 (arriving from the south). The high proportion of arrivals under VFR is a consequence of favorable year-round weather conditions.

Control of IFR traffic is achieved by allocation of the space through which the aircraft must fly to different controlling agencies. The principal air traffic controlling agencies affected by aircraft utilizing Tinker AFB are Tinker Tower Control, Oklahoma City Approach and Departure Control, and Fort Worth Center Control; the latter two jurisdictions are shown in Figure 3.1.1-A.

Local control towers "own" all the space within 5 miles of each tower from ground level up to 3,000 feet above the ground. The tower may delegate responsibility for this space to another agency (particularly under IFR conditions), but the tower controller has absolute authority to permit take offs and landings. For example, a pilot departing Tinker under IFR conditions would revert to Oklahoma City Departure Control as soon as he is airborne. Departure Control owns all of the space within 35 miles radius of Oklahoma City and, except for tower space, from ground level up to 12,000-feet altitude; thus sometime prior to reaching 12,000 feet in his departure route, the pilot would normally revert to Ft. Worth Center Control on instructions from Oklahoma City Departure Control.

An important aspect of this spatial control concept is the airway route structure. Most point-to-point traffic proceeds via an air route structure that crisscrosses the entire country. The route structure is keyed to radio stations that serve a location/identification function. Routes in the low altitude structure (below 18,000 feet) have V for Victor-numbered designations. Above 18,000 feet, the route structures carry J-numbered designations. Radar service is also keyed to the airway structure.

The transition to and from the air route structure to the local airport control is really the principal function of the approach and departure control agencies. With this background it is useful to examine in very general terms the flight patterns that currently exist at Tinker.

*Note: USAF pilots are authorized to cancel IFR when the destination air base is in sight.

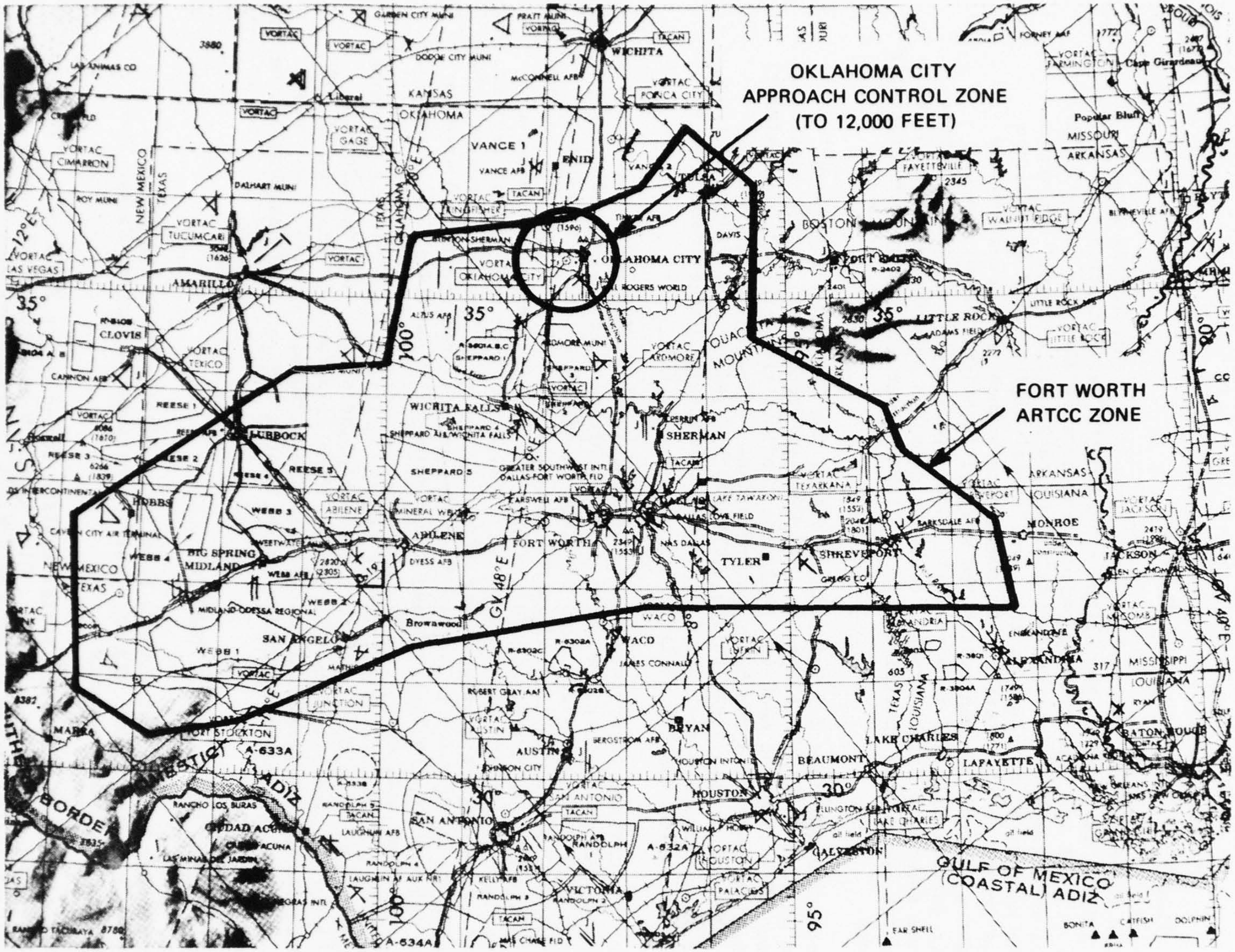


FIGURE 3.1.1–A AIR TRAFFIC CONTROL JURISDICTIONS

3.1.2 FLIGHT PATTERNS AND TOWER EVENTS

Figure 3.1.2-A depicts air traffic patterns and the surrounding community. Table 3.1.2-A is keyed to the flight tracks patterns identified in Figure 3.1.2-A and summarizes departure and arrival data for Runway 17/35. Arrival and departure data presented in the table are measured as events. For the purpose of this study, the term "event" will be used in order to analyze impact on air traffic. An event occurs when an aircraft passes (by virtue of radio communication and spatial location) out of one air traffic jurisdiction and into another. Some operations may result in more than one event per flight track. Such would be the case for tracks 17J and 35J, which exceed the spatial limits of Tinker Tower Control by a considerable distance.

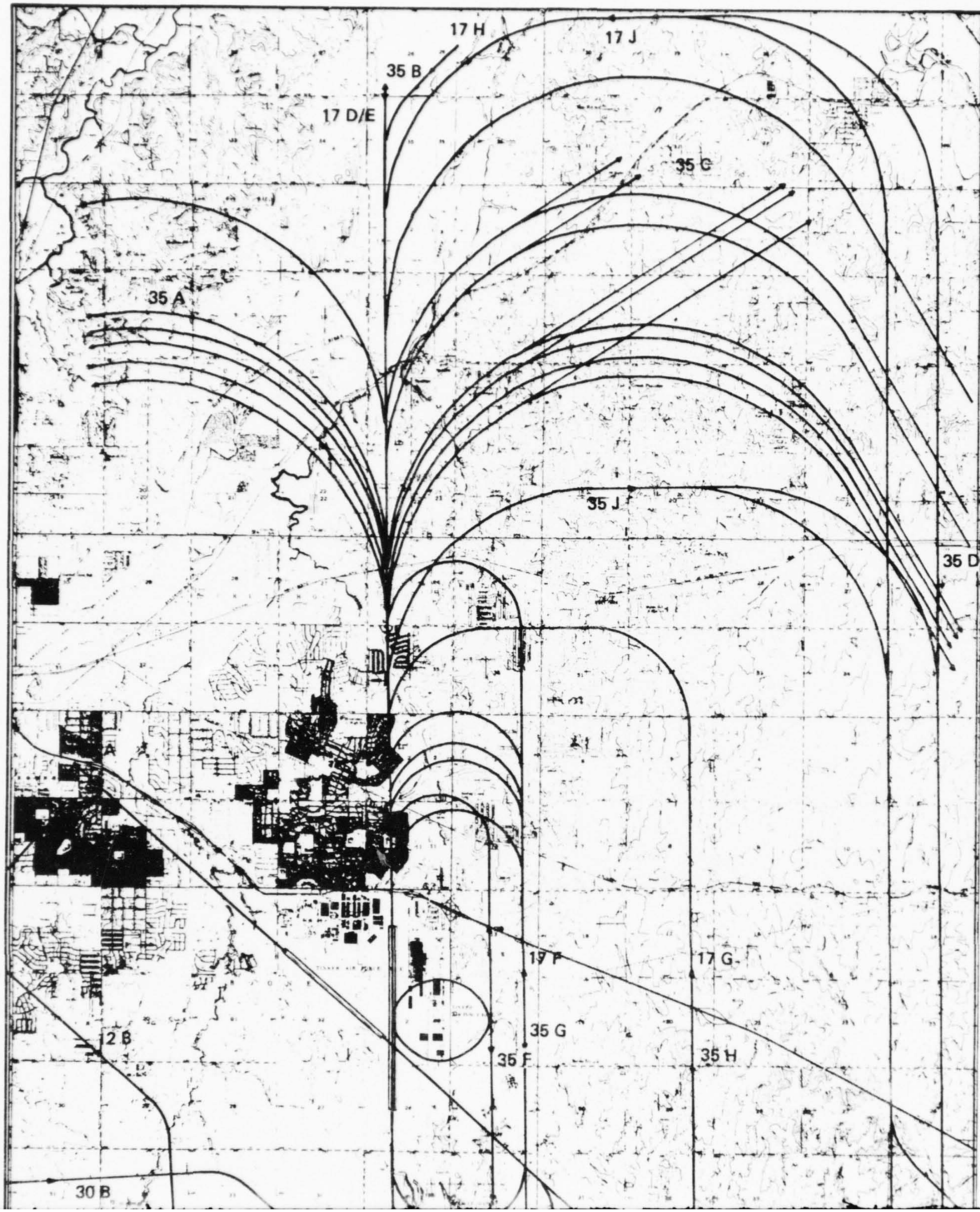
An inspection of Table 2.5.1-A indicates that the current yearly tower events consist of 22,126 take-offs, 12,298 go-arounds and 22,126 landings. This suggests that for each two full stop landings there is one (approximate) practice approach or a touch-and-go operation. In either event, a race track pattern of some kind is likely. Table 3.1.2-A is a breakdown of these events into flight tracks, which, in turn, permits the determination as to whether the event was VFR or IFR.

Whether an aircraft is approaching Tinker under IFR or VFR has considerable bearing on its noise level relative to its position over the ground. Appendix B of this study has been provided to assist the reader in understanding the rate of descent of approaching aircraft with respect to flight track patterns. In brief, aircraft making instrument approaches on Runway 17, approach on a glide slope (vertical profiles over ground) of 2.5 degrees. The ILS glide slope to Runway 35 is currently set at 3 degrees. However, the precision approach radar to Runway 35 is selectively reduced from 3 degrees to 2.5 degrees for the Tinker based F-105's and after December 1975, Runway 35 ILS glide slope will be set at 2.5 degrees. By way of comparison, a substantial portion of current Tinker traffic utilizes a visual type approach, which may be accomplished at a much steeper glide slope. For example, the F-105 aircraft typically has a 5.8% descending slope when landing out of 360° overhead landing pattern. The steeper approach minimizes noise in two ways: reduced power, a greater elevation and/or distance to a fixed observer on the ground.

3.1.3 PRESENT IMPACT ON AIR TRAFFIC

The preceding section establishes baseline conditions with regard to aircraft utilizing Tinker AFB and their operational effect on Tinker Tower Control as measured by events.

On a regional basis, current Tinker traffic accounts for 39.3% of the 144,000 IFR events handled by the Oklahoma City Approach and Departure Control. On a sectional basis, Tinker departures (28,275 in 1973) represent 5.6% of all departures handled by Ft. Worth Air Traffic Control Center and/or 18.0% of all military departures handled by Ft. Worth ARTCC (see Table 3.1.3-A).


17 H
17 J
35 B
17 D/E
35 G
35 A
35 J
35 D
17 F
17 G
35 G
35 F
35 H
12 B
30 B

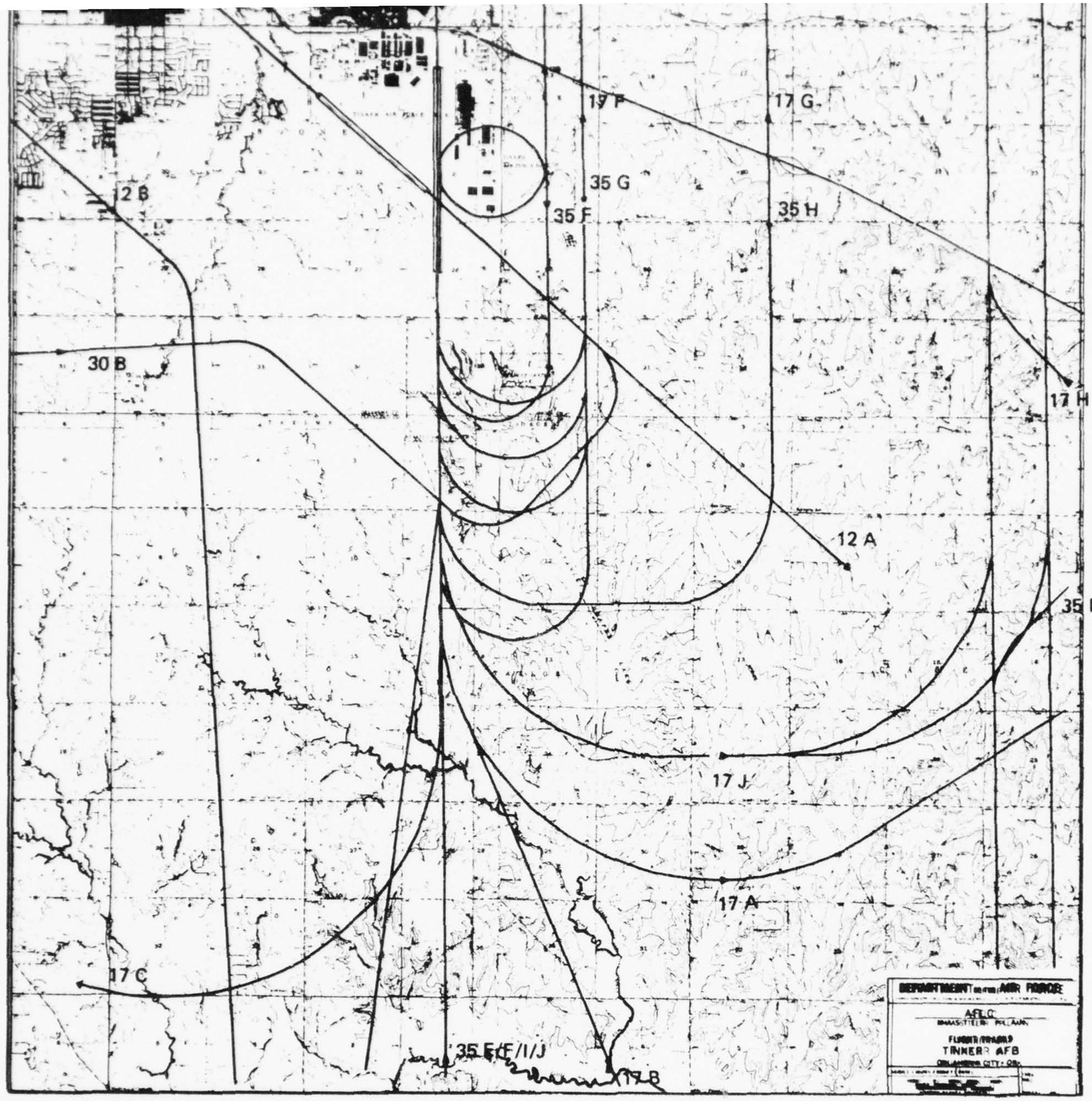


FIGURE 3.1.2–A FLIGHT TRACKS AND THE SURROUNDING COMMUNITY – TINKER AFB

Table 3.1.2-A

Air Traffic Summary, Present and Proposed (AWACS), Tinker AFB[1]

Daily Tower Events

	DEPARTURES (IFR)				Arrivals: VFR			Arrivals: IFR		TOTALS	TOTALS[2]
CURRENT	17A	17B	17C		17D	17F	17G	17H(1)	17E	All 17	Run 17/35
	56.7/2.1	7.7/.8	12.2/.7		13.4/0	10.4/0	1.2/0	20.5/1.3	31.7/1.7	153.8/6.6	253.4/11.4
	35A	35B	35C	35D	35F	35G	35H	35I(1)	35E	All 35	
	9.1/.9	2.9/.2	8.2/.9	29.5/.5	8.9/0	6.9/0	.9/0	13.4/.8	19.8/1.5	99.6/4.8	

	Departures (IFR)			Low Approaches and Arrivals (IFR)			Totals	Totals
AWACS (Only)	17A1	17A	17C	17J	17E		All 17	AWACS
	1.5/.08	1.5/.08	1.5/.08	28.45/0	4.5/.24		37.45/.48	61.8/.78
	35A	35C	35D	35J	35E	35E1	All 35	
	.97/.05	.98/.05	.98/.05	18.49/0	2.78/.14	.15/.01	24.35/.30	

Notes: 1-Based on 260 operating days/year
2-Run 12/30 is VFR only accounts for less than 5 percent of traffic.

Daily totals have been computed on the basis of 260 operating days per year. Of the two numbers given under each flight pattern, the first is daytime (0701-2200) and the second is nighttime use (2201-0700). Totals given do not include events on Runway 12/30 (VFR) which account for less than 5 percent of total traffic.

Table 3.1.3-A

Departures, Overs, and Aircraft Handled at
Ft. Worth Air Route Traffic Control Center, 1973

	Total	Air Carrier	Air Taxi	General Aviation	Military
Departures	502,669	228,088	17,949	99,858	156,774
Domestic Overs	223,498	86,240	926	32,614	103,718
Aircraft Handled	1,228,836	542,416	36,824	232,330	417,266

3.1.4 ACCIDENT RECORD/FLIGHT HAZARDS

The principal hazards to the surrounding communities are attributable to the possibility of dropped objects (from aircraft) and aircraft accidents involving non-military personnel/property. By way of background, the USAF reporting system is defined below:

Category	Man-Hours to Repair Aircraft
Major accident	900 +
Minor accident	150 +
Incident	None to less than 150
Hazard report	No damage

Fighter type aircraft drop objects for a number of reasons. They carry external loads such as fuel tanks, ordnance, electronics pods, etc. As a general rule, most externally mounted stores can be jettisoned as a matter of safety in the event that the pilot is required to make an emergency landing soon after takeoff. The external load jettison area for Tinker is located just south of the field (see Figure 2.5.4-A). Occasionally, removable panels, landing gear doors, drag chutes, canopies, and other extendable components are inadvertently lost in flight. During the period 1 January 1972 through June, 1974, the USAF experienced some 752 dropped objects from fighter type (F series) aircraft.

A significant portion of these drops occur within the confines of USAF bases (i.e., taxiways, runways, ramps, etc.). Tinker's experience with dropped objects has been reasonably good reflecting the predominance of large transport type-traffic. Table 3.1.4-A describes incidents of dropped objects at Tinker AFB during 1972.

Table 3.1.4-A

Dropped Objects at Tinker AFB During 1972

Date	Aircraft	Object	Phase of Flight	Location
4 April 72	F-4D	Front Canopy	Take off	Within base perimeter
8 Nov 72	EC-135	Trailing Antenna	Level flight	Functional Check Flight Area
9 Nov 72	VC-137C	Crash position indicator	Descent	35 miles south of Tinker

The record of major aircraft accidents associated with flight operations at Tinker goes back to October of 1957. Table 3.1.4-B lists the accident dates, the aircraft involved, and phase of flight. There have been a total of 17 accidents from 1957 through July of 1974. Twelve of those accidents, or over 70 percent of the total, involved single-engine aircraft. Over one half (53 percent) occurred within the field boundaries. All aircraft accidents are unfortunate in that government property is lost or damaged, crew members may be lost or injured, and military capability is reduced. It is doubly unfortunate when civilian property and/or lives are involved. Five of the Tinker accidents were concentrated on the approach path to Runway 17 within the confines of Midwest City.

Tinker Air Force Base does not have a serious bird strike problem, with no recorded cases of aircraft damage due to this hazard, although some aircraft have struck birds on occasion. The migration path of the Franklin's Gull is about 70 miles east of Tinker; these do occasionally stray westward to pose some potential for bird strike hazards. Starlings and swifts have their flyway closer to Oklahoma City and thus present a more critical potential problem for Tinker. Last fall, ingestion of starlings into an engine of a commercial flight operating out of Will Rogers International Airport forced an emergency landing.

Table 3.1.4-B

Record of Major Aircraft Accidents at Tinker AFB, 1957-1974

Date	Aircraft	Phase Of Flight	Impact Size	Crash Area	Aircraft Damage	Property Damage	Location
10/57	C-119						2.7 miles from approach end of Runway 17 (Midwest City)
4/58	F-100F	Take off					On Runway 17
11/59	F-104 & T-33	Midair Collision					7 miles SE of Tinker
3/60	U-3	Landing			Destroyed		On Runway 35
8/61	KC-97	Landing			Destroyed		200' left of Runway 35
8/61	F-100	Landing			Destroyed	Damage to Housing Unknown	1 mile North of Runway 17 Ferguson Drive Midwest City
9/62	B-57	Take off			Destroyed	Damage to trees & fence	3 miles NE of Tinker
1/63	T-33	VFR pattern	20' diam	120'x450'	Destroyed	$200 damage to fence, trees & grass	1/4 mile south app to Runway 35
3/65	T-33	VFR pattern	None		$286	None	Grass at edge of runway

Table 3.1.4-B continued

Record of Major Aircraft Accidents at Tinker AFB, 1957-1974

Date	Type A/C	Phase Of Flight	Impact Size	Crash Area	A/C Damage	Property Damage	Crash Location
4/65	T-29	VFR pattern	No crater	1200 ft^2	$112,027	None	200 feet east of Runway 17 at 4700' marker
4/66	T-33	Aborted take off	None	650'x200'	Destroyed	Unknown	650' past departure end of Runway 30
8/67	A-7	Landing	Unknown		Destroyed	Unknown	10-1/2 miles SE of Tinker
11/68	F-4		Unknown		Destroyed	Unknown	Non-populated area 1-1/2 miles SE of Tinker
10/69	F-100F	VFR flameout pattern	12'x30'	175'x508'	Destroyed	Total destruction of 3 houses extensive damage to two houses and minor damage to others. Estimated total damage $55,000 to $75,000	4700' short of Runway 17 approximately 1100' east of extended centerline
2/70	T-37	VFR pattern	Unknown		$950	None	Wheels up landing on runway
5/74	T-38		Unknown		Destroyed	Destroyed house	2-1/2 north of Runway 35
4/75	F-105	landing	Unknown	Unknown	Major	None	West of Runway 17 at midfield

3.2 PHYSICAL SETTING

3.2.1 GEOGRAPHIC LOCATION

Tinker AFB (Lat. 35°-25'N; Long. 97°-23'W) is located in central Oklahoma within the political subdivision of the City of Oklahoma City. The State of Oklahoma is located just south of the geographic center of the United States. Tinker is approximately 200 air miles north of Dallas, Texas.

3.2.2 TOPOGRAPHY

Physiographically, the State of Oklahoma is a plain which, with numerous interruptions, slopes from northwest to southeast. Most of the state falls within the U.S. Physiographic Division of the Interior Lowlands. Oklahoma is further divided into eleven distinct physiographic provinces with Oklahoma County situated in the Province of Redbed Plains, which traverses the entire state from north to south and forms the most extensive region [55].

Elevations within Oklahoma range from 400 feet above sea level in the southeast to nearly 5,000 feet in the western panhandle. Within the area of Oklahoma City, the elevations range between 800 feet and 1,600 feet above sea level; the general elevation of Tinker AFB is about 1,200 feet. The terrain is characteristically gently rolling plains in which the hills seldom exceed 100 feet in height and slopes of greater than 5 percent are only rarely encountered [30, 32, 55].

The area of Tinker AFB is located in the Arkansas River Watershed within the North Canadian River Drainage Basin. Tinker AFB is located between the origin of two drainage systems, Crutcho and Soldier Creeks. Crutcho Creek passes to the west and Soldier Creek to the east, with the two streams converging at a point about four miles north of the base and finally flowing into the North Canadian River, as discussed in Section 3.3.1.

3.2.3 GEOLOGY

Within Oklahoma, Canadian, Cleveland, and Logan Counties, the exposed rocks include consolidated sedimentary rocks of Permian age and unconsolidated terrace deposits and alluvium of Quaternary age. The unconsolidated rocks consist of sand and gravel, with some clay occurring as alluvium deposits along streams, as terrace deposits on higher lands adjoining streams, and as dune sand overlying alluvium or terrace deposits. The consolidated rocks, as found at Tinker AFB, are siltstone, sandstone, and shales with amounts of gypsum and dolomite. The area of Tinker is dominated by the occurrence of shale. The unconsolidated rocks are geologically younger than the Permian rocks.

The strike of the consolidated rock ranges from west-northwest Canadian County to north Oklahoma County and reaching into north-northwest Cleveland County. The regional dip is 30 to 35 feet per mile westward and southwestward in the direction of the trough of the Anadarko Basin. The regional structure is generally that of a westward dipping homocline with irregularities related to the structural high beneath the Oklahoma City oil field and the structural trough within the Midwest City area [32].

3.2.4 SOIL CONDITIONS

Oklahoma County is situated within the Redbeds Plains Province. The soils characterizing the Redbeds have been formed from thick layers of clay, soft red shales, and thin layers of sandstone and are deep, fine-textured soil with a red color. These soils have a high water-holding capacity, which in addition to their depth and fertility led to the destruction of most of the native prairie for agriculture [55].

Most of the area of Tinker AFB is characterized by the Renfrow-Vernon-Bethany Association, loam and clay soils located on nearly level to slightly sloping terrain. The dominant soil series of this association within the area of Tinker are the Vernon-Zaneis complex and the Renfrow clay loam. These soils exhibit a low to very low permeability, medium internal drainage and a high water-holding capacity. Their rate of water transmission is very slow and runoff potential is high, as both series are characterized by either clay or a claypan near the surface. Management of such soil requires controlling water erosion and maintaining soil structure and content of moisture. The area is underlain by relatively impervious material, weathered shale, clay and siltstone. The depth to bedrock within the area of Tinker is generally more than 40 inches [62].

The clay-loam soil dominant at Tinker AFB exhibits a moderate to high shrink-swell potential which requires that streets and buildings be constructed to compensate for soil movement. Extensive ground preparation has been required at Tinker in the past, particularly for runway construction, to compensate for such limiting conditions. Table 3.2.4-A presents the degree and kind of limitation to nonfarm uses of soils for Renfrow clay loam and the Vernon-Zaneis complex, the two types of soil generally encountered at Tinker and at the site of the proposed family housing.

TABLE 3.2.4-A

Degree and Kind of Limitation to Nonfarm Uses of Soil

Renfrow Clay Loam and Vernon-Zaneis Complex

Soil name and map symbol	Septic tank filter field	Sewage lagoons	Sanitary land fill	Sites for low buildings	Road and streets	Lawn, shrubs and trees
Renfrow clay loam, 1 to 3 percent slopes (RfB)	Severe: Very slow percolation	Slight-----	Severe: Material difficult to excavate	Severe: High shrink-swell potential	Severe: High shrink-swell potential	Moderate: Droughtiness
Vernon-Zaneis complex, 3 to 5 percent slopes (VzC)	Severe: Slow to very slow percolation	Moderate: Sandstone at 4 feet on Zaneis portion	Severe: Material difficult to excavate	Severe: Moderate to high shrink-swell potential	Severe: Moderate to high shrink-swell potential	Severe: Droughtiness

	Gardens	Golf fairways	Picnic areas	Intensive play	Paths and trails	Camping areas	Parks
R*	Moderate: Droughtiness	Moderate: Droughtiness	Moderate: Clayey	Moderate: Very slow permeability	Slight-----	Slight-----	Moderate: Vary slow permeability
VZ**	Severe: Droughtiness	Severe: Droughtiness	Moderate: Vernon part is clayey	Severe: Moderately sloping relief	Moderate: Trafficability	Severe: Trafficability	Severe: Droughtiness

*Renfrow
**Vernon-Zaneis

Source: U.S. Department of Agriculture, Soil Conservation Service, Soil Survey: Oklahoma County, Oklahoma, in cooperation with the Oklahoma Agricultural Experiment Station, issued February 1969.

3.3 ENVIRONMENTAL SETTING

3.3.1 WATER

3.3.1.1 Surface Hydrology

The principal drainage systems in Oklahoma are those of the Arkansas and Red Rivers, which enter the state from the west and cross the state in an easterly or southeasterly direction to eventually converge with the Mississippi River. The division between these watersheds crosses the extreme southwestern corner of Canadian County; the area to the north of this line is within the Arkansas River Watershed and to the south within the Red River Watershed. Oklahoma County (and the area of Tinker AFB) is situated within the Arkansas River Watershed.

The Arkansas River enters the state from Kansas just east of the center of the northern boundary and flows southeastward forming an extensive valley between the Ozark and Ouachita Mountains. Its major tributaries are the Salt Fork, Cimarron, and the North and South Canadian Rivers, which drain the western and central parts of the state, and the Verdegris, Grand, and Illinois Rivers which drain the eastern part of the state.

Within the four-county area of Logan, Canadian, Oklahoma, and Cleveland Counties (ACOG region), the Arkansas River watershed is divided into four major drainage basins. The basins and their approximate areas in square miles are as follows: Cimarron River (1,083 sq. mi), Deep Fork (326 sq. mi), North Canadian (641 sq. mi) and the Canadian (843 sq. mi). The area of Tinker AFB is located within the North Canadian River Basin. Within these basins, the stream pattern is one of fairly evenly distributed streams of equal size [32].

The North Canadian River, recently renamed "North Branch of the Canadian River" by the Corps of Engineers, has its headwaters in the Rocky Mountains as do the other rivers that pass through this area of Central Oklahoma. All of these rivers are subject to extreme seasonal fluctuations from heavy rains and melting snow. The North Canadian River passes through broad sandy-valleys and is characteristically red, turbid, and sand-laden [55].

Tinker AFB is located south of the North Canadian River between the beginnings of two small drainage systems, Crutcho and Soldier Creeks, both tributary streams of the North Canadian River. Crutcho Creek flows in a northerly direction as it crosses the Tinker property in the area of the golf course and then turns in a northeasterly direction until it meets the North Canadian River. Drainage from the western-half of the air base is generally into this creek. In the eastern-half of the air base, drainage is towards Soldier Creek, which flows in a northwesterly direction until it meets Crutcho Creek. Midwest City is located to the north of Tinker AFB on both sides of a low ridge separating the Crutcho and Soldier Creek drainage basins.

There is some problem of local flooding in flat areas along the alluvial plain of the North Canadian River and the Crutcho Creek and Soldier Creek

tributaries. The annual average precipitation is 30.91 inches; the wettest months are April, May and June with averages of 3.12, 5.19, and 4.47 inches, respectively [30].

Major waterbodies within the area are Lakes Overholser, Hefner, Stanley Draper and Thunderbird. All are reservoirs constructed for municipal water supply. The Oklahoma City Water Department (OCWD) plans to expand its source of water supply by constructing an additional holding lake in the area west of Stanley Draper Lake. The planned holding lake will encompass 7100 acres or 14.5 square miles. At the present time the OCWD has purchased 60 percent, 3900 acres, of the required land area.*

3.3.1.2 Aquifers

Major aquifers within the Central Oklahoma area are the terrace and alluvium deposits, the Garber Sandstone and Wellington Formation, and, to a lesser extent, the Rush Springs Sandstone.

Alluvium deposits along the North Canadian River average about two miles in width, and in the area of Oklahoma City are more than three miles in width. The sand, silt, and clay range in thickness from a few inches to approximately 90 feet. Groundwater in the alluvium is variable in quantity, with well yields ranging from less than 100 to more than 599 gallons per minute (gpm) in the thicker sections. Fluctuations of the groundwater level in the alluvium of the North Canadian River valley suggest recharge in the amount of 17.5 percent of the annual precipitation. Thus, on the basis of 29 inches of precipitation, the average annual recharge is about 270 acre-feet per square mile. Most of the natural discharge from the North Canadian River alluvium is attributed to transpiration of groundwater by phraetophytes (plants with roots extending to the water table) [32].

The most important source of groundwater in the area is from the Garber Sandstone and Wellington Formation, which constitute a single aquifer. Both are lenticular beds of sandstone, siltstone, and shale varying in thickness within short lateral distances. On the basis of the estimate of 167 million acre-feet of aquifer and a specific yield of 20 percent, the Garber Sandstone and Wellington Formation in Oklahoma and Cleveland Counties represent a total of 34 million acre-feet of available water. The average annual recharge for this 800 square miles area in the two counties is estimated at 72,000 acre-feet [32].

The cities of Midwest City, Del City, Moore, Norman, Edmond and Nichols Hill obtain a portion of their water supply from these formations, though their main source of water supply is the numerous reservoirs in the area. Oklahoma City obtains the major portion of its water supply from Lakes Overholser, Hefner and Stanley Draper; Midwest City, Del City, Moore and Norman obtain the major portion of their water supply from Lake Thunderbird.**

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* Personal communication, Mrs. Dorothy Garr, Oklahoma City Water Department, Oklahoma City, Oklahoma, January 14, 1975.

** Personal communication, Mary Lou Spear, Oklahoma City Water Department, Oklahoma City, Oklahoma, May 28, 1975.

3.3.2 AIR QUALITY

3.3.2.1 Analysis Methodology

3.3.2.1.1 Concepts

The term "air quality" is used to describe the state of cleanliness of the ambient air in a specified locality, area, or region. Air quality is degraded by the presence of air contaminants or "pollutants" in the form of gases, liquid droplets, or solid particles. The effects of air pollutants include hazards to health, damage to property and vegetation, restraint of activities (such as might be caused by a reduction in visibility), and esthetic or nuisance effects such as smoke plumes and odors. Air quality may be expressed directly in terms of ambient concentrations of air pollutants or indirectly in terms of effects such as visibility reduction or odor level.

Air pollutants are emitted into the ambient air by both natural and man-made sources. Natural sources include vegetation, wind-generated dust, volcanoes, and lightning. Man-made sources include mobile and stationary combustion systems, industrial processes, domestic, institutional, and commercial heating systems, and agricultural and waste disposal activities. On a world-wide basis, nearly all pollutants are emitted in greater quantities by natural sources than by man-made sources. However, the concentrations of human activities in urban areas are chiefly responsible for degraded air quality in those areas. Consequently, air pollution is primarily a localized or regional problem in areas of high population density.

Quantitative information on rates of pollutant emission in a particular region is necessary to determine the sources of degraded air quality and to plan air quality control measures. A summary of emission rates for sources in a region is called an "emission inventory." An emission inventory may be expressed in terms of the nature and locations of discrete sources or in terms of total emissions per unit area. The term "emission density" is used to describe the average rate of emission of a specific pollutant per unit of geographical area.

Air quality at a specific location or within a region is dependent upon the magnitude and distribution of emission sources in the region and also on meteorological factors which affect the dispersion of emissions from these sources. These factors include the wind speed near ground level and the stability of the atmosphere, and the combined effect of these factors is referred to as the "air pollution potential" for the region. Atmospheric stability refers to the processes that cause vertical and lateral mixing or spreading of air pollutants as they are carried away from their sources by the wind. Stability is characterized by rates of diffusion associated with atmospheric turbulence and by a mixing height that is the upper elevation of the meteorological mixing layer. Vertical diffusion of pollutants occurs very slowly above the mixing layer in comparison with diffusion rates within the layer. Thus, the mixing height

is a measure of the altitude to which pollutants can be expected to diffuse in their passage through the urban atmosphere. High wind speeds and mixing heights represent conditions of low air pollutant potential. On the other hand, low wind speeds and mixing heights represent conditions of high air pollution potential since pollutants emitted under these conditions are effectively trapped within a shallow layer and have a long residence time in the urban atmosphere.

Air quality at a specific location is the total effect of all sources whose emissions are transported to that location by the processes of meteorological dispersion. This effect is termed the "impact" of these sources on the air quality at that location. Each source is considered to have its individual impact on the local air quality, and the combined effect of all sources is the total air quality impact.

PAGES 48 - 50

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3.3.2.1.2 Analysis Procedures

An Air Force base located in an urban area is a complex source of air pollutants. Individual sources on the base include mobile sources consisting of aircraft and ground vehicles and stationary sources consisting of heating plants, fuel storage facilities, and aircraft maintenance facilities. These sources emit pollutants in five classes for which Federal air quality standards have been established:

1. Carbon monoxide (CO)
2. Hydrocarbons (HC)
3. Nitrogen oxides (NOx)
4. Sulfur oxides (SOx)
5. Particulates (Part)

Some of the emissions from air base activities are emitted directly into the urban atmosphere by aircraft flight operations. The remainder of the air base emissions are produced within the confines of the base and enter the urban atmosphere through the meteorological dispersion processes of wind and turbulence. Thus, the base has an impact on the quality of the overall urban atmosphere, which is termed the "area impact" of the base. However, because the base is a localized source of emissions, it has a more pronounced effect on the air quality within the base property and in its immediate vicinity. This effect is termed the "local impact" of the base. Both the area and local impacts of the base are of interest from the standpoint of public health.

The impact of a specific source on urban air quality cannot be determined directly by measurements of pollutant concentrations because the pollutants that originate on the base cannot be distinguished from pollutants from other sources. The total pollutant concentration at any particular location in an urban area is the total of contributions from all sources that affect that location. The impact of a source can be determined indirectly by means of an analytical procedure involving four steps:

1. An inventory of emissions from the source;
2. An inventory of emissions from areas surrounding the source;
3. A qualitative impact analysis based on the emission inventories; and
4. A quantitative impact analysis involving an analysis of the dispersion of pollutants from the sources and its surrounding areas.

The inventory of emissions from the source - in this case Tinker AFB - involves identification, evaluation, and summation of emissions from all individual sources associated with the base. The inventory of emissions from surrounding areas is a similar summation of emissions from sources located within the base environs. The extent of the area regarded as the base "environs" is somewhat arbitrary but should be selected as an area which is likely to be impacted by emissions from the base and which in turn impacts the base with its own emissions. Since the actual area of impact is difficult to determine by inspection, the base environs, for purposes of an impact analysis, are generally designated arbitrarily according to

existing political boundaries surrounding the base. The existence of emission inventories for political subdivisions in the base vicinity may also influence the designation of the base environs.

The qualitative impact analysis entails comparison of the total emissions from the base with total emissions from the environs to determine the contribution of the base to the total air pollution burden of the area. This comparison provides a qualitative measure of the area impact of the base. Similarly, the density of emissions at the base can be compared with emission densities in the environs to obtain a qualitative measure of the local impact of the base. The emission density comparison is enhanced if air quality data are available for the environs. In many instances, these qualitative impact analyses are sufficient to establish that the impact of the base on local and area air quality is not significant. However, if the qualitative analysis is not sufficient or if the analysis indicates the possibility of a significant impact, the final analysis step involving a dispersion analysis is required.

The dispersion analysis involves the determination of the distribution of pollutants from the source throughout the atmosphere. The analysis requires an evaluation of the effects of meteorological dispersion processes on the transport of pollutants from all sources. The results of the analysis include predictions of the pollutant concentrations caused by the emissions from the base, and the analysis results can include measures of both local and area impact of the base. The accuracy and detail provided by the predictions are dependent upon the accuracy and complexity of the analysis procedure.

The contribution of an airport or air base to the total pollutant burden of the area in which it is located generally is found to be small [59, 60]. Similarly, the impact of airport emissions on local air quality also is found to be small except for commercial airports with high traffic levels located in congested metropolitan areas [60, 61]. Air Force bases in general do not fit this latter description in that their traffic levels are only a fraction of the levels at major commercial airports, and Air Force bases are located either in isolated areas or on the fringes of metropolitan areas. Consequently, it is reasonable to expect at the outset of an air quality impact analysis for an Air Force base that the impact will not be significant and that a qualitative impact analysis will be sufficient to establish this conclusion.

3.3.2.2 Tinker Air Force Base Emissions

3.3.2.2.1 Emission Sources

In conducting an inventory of air pollutant emissions at Tinker AFB, all sources within the confines of the base were considered. Carbon monoxide, hydrocarbons, nitrogen oxides, particulates, and sulfur oxides are emitted primarily by aircraft and their service vehicles, motor vehicles, fuel storage tanks, heating units, repair facilities, and engine test cells at Tinker AFB. Secondary sources include training fires, locomotives,

aircraft run-up stands, and vehicle and tank-truck refueling stations. Sources that are present but are considered negligible include incinerators, lubricating oil storage tanks, and auxiliary generators.

At most airports, aircraft engines emit more pollutants than any other emission source category. Modern jet engines emit most of their unburned hydrocarbons and carbon monoxide during low-power operations such as idling and taxiing. Conversely, their nitrogen oxide, sulfur oxide, and particulate emissions are associated with high-power or high-fuel-flow rate operations.

Emissions are grouped into three major categories: (1) those that are emitted at ground level, (2) those that are emitted in the mixing layer (between the ground and an altitude of 3,000 feet above the ground), and (3) those that are emitted above the mixing layer. The first category, called "ground emissions," has the greatest impact on the air quality in the immediate vicinity of its source. This is because the emissions remain at ground level (in the lowest regions of the mixing layer) and impact pollutant receptors (people, plants, and animals) in the vicinity of the source before the emissions become diluted and diffused.

The second emissions category, called "low-level flight emissions," is dispersed over a relatively large area prior to impacting receptors at ground level. Consequently, the impact of these emissions is not necessarily greatest in the vicinity of the source, but is relatively widespread.

The third emissions category, called "high-level flight emissions," is dispersed horizontally in the atmosphere but diffuses very slowly in the vertical direction. Consequently, this emissions category is considered to have no impact on receptors at ground level.

In this impact assessment, only the first and second emissions categories are considered. Whenever the term "total emissions" is used, it includes ground and low-level flight emissions.

Emission sources that vary with aircraft activity are aircraft, the aerospace ground equipment (AGE), engine maintenance operations, aircraft refueling activities, and vapor losses from fuel storage tanks. AGE emissions occur as a result of the operation of the various aircraft service vehicles that must be utilized to make an aircraft ready for flight. This equipment includes fossil fuel-powered tow trucks, air compressors, and electric generators.

Aircraft engines are repaired and tested in accordance with a specific schedule, and maintenance operations require that engines be tested either out of the aircraft in test cells or in the airplanes on run-up stands. Emissions from the engine during these operations are similar to those that occur during flight.

Aircraft refueling and storage tank emissions result primarily from the displacement of volatile liquid vapors. In general, for every gallon of volatile liquid that is transferred from one tank to another, a gallon of air and vapor mixture is displaced into the atmosphere. The quantity of vapor that is displaced into the atmosphere depends upon the vapor pressure and molecular weight of the liquid, the method of filling the tank, and the tank configuration. An additional source of refueling emissions is the spillage of fuel either during the actual filling operation or as a result of expansion of the fuel in the aircraft's tanks as the liquid warms and expands in the sun.

These vapor displacement (working) emissions are, of course, not unique to aircraft but occur any time any tank is refilled with a volatile substance. Almost all of the storage tanks on the base are subject to these working losses. Another type of loss associated with fuel storage is the so-called "breathing" loss. This occurs from liquid and vapor volume changes as the temperature of the tank's contents changes during daily and seasonal temperature fluctuations. These emissions are most pronounced in the common fixed-volume type of storage tank. Tanks such as the main aircraft fuel storage tanks at Tinker, however, are designed to minimize these losses. Known as floating-roof tanks, their volume changes as the volume of the contents changes. The roof floats on top of the liquid fuel surface and is sealed around the edges with a sliding type gasket. In this way, breathing losses are kept to a minimum while the working losses are reduced to negligible amounts.

Emissions from other sources are independent of aircraft activity. Motor vehicle emissions are dependent upon the size of the work force. The newer the vehicle, in general, the better the anti-pollution equipment on the vehicle and the lower the emissions from this source. The larger the work force, the larger the number of vehicles driven to and from work.

The heating units on the base burn natural gas and use Number 2 fuel oil on an emergency basis. Ninety-five percent of all the natural gas and all fuel oil is burned in six large heating/cooling units that heat most of the offices, provide domestic hot water and provide steam for industrial usage. The rest of the natural gas is burned in individual domestic-type heating units and hot water heaters in on-base family housing as well as various small office buildings.

Emissions from the repair facilities consist primarily of hydrocarbons. These are emitted from paint spray operations, cleaning and degreasing facilities, laboratory hoods, and other maintenance operations. Pollutant emissions other than hydrocarbons come from metal plating operations, welding and soldering booths, and the like. At the time of this writing, there are no data available which can be used to determine the non-hydrocarbon emission rates from these sources. Emission estimates are now being conducted for these and all other maintenance facilities at Tinker, and accurate emission data will be available soon. For this reason, these non-hydrocarbon emissions have not been included in this study.

3.3.2.2.2 Analysis Methods

The compilation of an emission inventory is a very obvious yet sometimes complicated procedure. Each air pollutant source in an area is cataloged as to its location and operating parameters. The source emissions are calculated by the multiplication of pertinent operational parameters (such as fuel flow rates) and appropriate emission factors (i.e., grams of carbon monoxide produced per 1000 pounds of fuel consumed) in order to achieve the mass of pollutant emitted per operation. The number of times this operation occurs per unit time (i.e., per year) will then determine the approximate mass of each pollutant emitted from this source per unit time.

Appendix A, Tables A-6 through A-25, presents the methodology and data used to determine the emission rates of each source on Tinker AFB.

3.3.2.2.3 Emission Inventory

A summary of the emission inventory calculations is given in Appendix A, Tables A-1 through A-5. The total emissions of each pollutant are presented as are the emissions from each significant source.

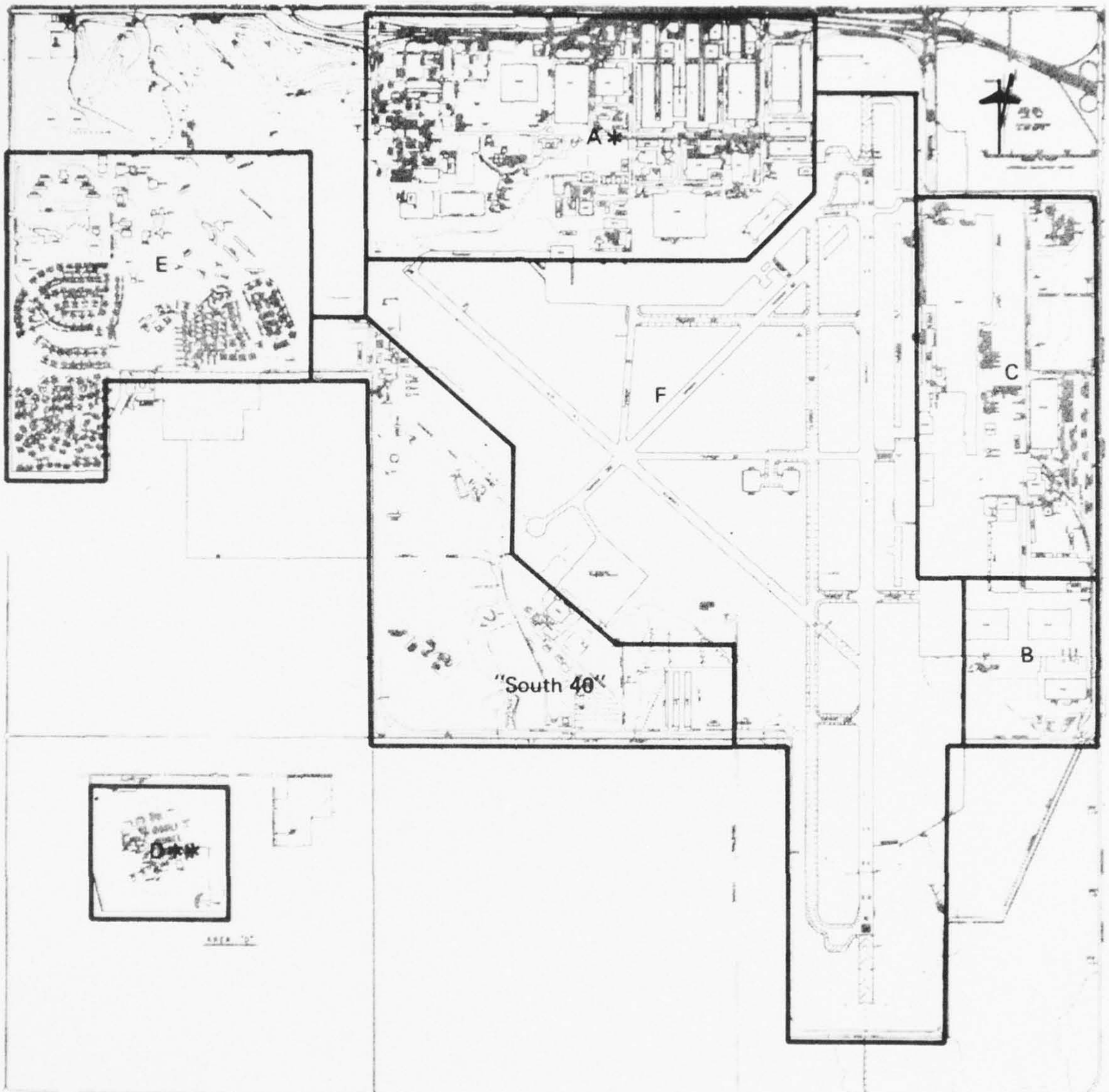
The emission density map, shown in Figure 3.3.2-A shows Tinker Air Force Base broken up into various grids. The pollutant sources contained within each grid space are listed in Tables A-1 through A-5 (Appendix A), and the emission densities resulting from these sources are listed in Table 3.3.2-B.

3.3.2.3 Regional Air Quality

3.3.2.3.1 Climatology and Air Pollution Potential

The climate in the region around Tinker AFB is dominated principally by the continental flow of air masses on the Great Plains. This continental domination produces large daily and seasonal temperature changes, as well as great variations in seasonal and annual precipitation. Occasionally there is a flow of warm moist air from the Gulf of Mexico. The prevailing wind direction is southerly during most of the year, except during January and February when northerly winds are dominant.

Summers are long and occasionally very hot. Since low humidity and strong breezes accompany these warm temperatures, the discomfort effect is somewhat lessened. Winters are milder and much shorter than those of the more northern Plain States. Periods of extreme cold during winter are infrequent. The annual mean temperature for the region is about 60 degrees F.



* Area Designations "A-E" Solely for Emission Density Analysis
** Actual Location of Area D – South Side of 59th Street Between Post Road and Douglas Blvd.

FIGURE 3.3.2–A EMISSION INVENTORY ZONE, TINKER AFB

Table 3.3.2-B

1974 Emission Densities, Tinker AFB*

10^3 Kg/Km^2 - YR

Zone**	Area (Km^2)	CO	HC	NOx	Part.	SOx
A	1.95	70	110	57	4.5	22
B	.43	71	74	54	4.0	12
C	1.24	300	370	350	30	40
D	.34	69	11	22	1.8	5.5
E	1.45	68	11	24	1.9	4.2
South 40	1.48	68	11	14	1.1	0.7
F	5.22	110	92	22	5.4	1.2
Overall	17.0	81	71	44	4.8	6.6

* Ground emissions only.

** Zones defined in Figure 3.3.2-A.

Precipitation occurs most frequently in spring and summer, with late fall and early winter being the driest time of year. The month with the most rain is May when thunderstorms usually occur, sometimes accompanied by hail and strong winds. Excessively heavy rains occur at times with amounts of 10 inches or more in a 24-hour period.

This region, along with other states in the southern Great Plains, has at times been subject to droughts of varying degree and duration, although the more frequent occurrence has been moderately dry summers and falls rather than extreme drought. The most recent severe drought occurred from 1951 to 1957. The tremendous increase in irrigation farming in the past several years has minimized the affects of drought conditions.

Winter precipitation is usually characterized by brief periods of freezing rain and sleet. The average snowfall for the region is less than 10 inches per year.

The meteorological data for Oklahoma City are presented in Table 3.3.2-C.

The air pollution potential for an area is the combination of meteorological parameters that determine the transport and dispersion of air pollutants. The horizontal diffusion of pollutants is determined mainly by the wind speed while the vertical diffusion is dependent on both atmospheric stability and wind speed.

Since the average wind speed for the region is moderately high (12 mph in summer and 15 mph in spring), the dilution factor of pollutants in the atmosphere is great and, therefore, the air pollution potential is low. Also the sky is unusually clear during most of the time, with annual average sunshine equal to about 68 percent of the total daytime hours. Because of this high percentage of clear skies along with moderately high wind speeds, favorable atmospheric conditions exist for maximum dispersion of pollutants during the daytime hours.

The Oklahoma City area is generally smoke free as a result of these favorable atmospheric conditions. Also the almost exclusive use of natural gas for heating in both industrial processes and in residential homes reduces the potential of high pollution concentrations. A clear sky at night allows for rapid cooling of the ground surface and can lead to the formation of surface-based inversions. However this inhibition of pollution dispersion is offset by the relatively high wind speeds which occur all year-round as indicated in Table 3.3.2-C.

Because of these meteorological conditions, the air pollution potential in the Oklahoma City region can generally be considered to be low. Air pollutants emitted in the area are subject to atmospheric conditions that are favorable to maximum dispersion rates and consequently result in low ambient concentrations.

Table 3.3.2.- C

Meteorological Normals for Oklahoma City

	Temperature °F				Wind	
Month	Daily Max	Daily Min	Average Monthly	Precipitation -inches/month	Prevailing Direction	Mean Speed MPH
Jan.	45.9	28.1	37.0	1.31	N	13.8
Feb.	51.3	31.2	41.3	1.37	N	13.9
March	59.5	37.5	48.5	1.97	SSE	15.4
April	70.6	49.1	59.9	3.12	SSE	15.3
May	78.1	58.6	68.4	5.19	SSE	13.7
June	87.4	68.5	78.0	4.47	SSE	13.2
July	92.8	72.2	82.5	2.37	SSE	11.5
Aug.	93.5	72.0	82.8	2.52	SSE	11.2
Sept.	84.7	62.9	73.8	3.02	SSE	11.6
Oct.	73.9	51.8	62.9	2.51	SSE	12.6
Nov.	58.8	38.0	48.4	1.56	S	12.7
Dec.	49.2	31.4	40.3	1.41	S	13.0
Year	70.5	50.1	60.3	30.82	SSE	13.2

Source: "Climatology of the United States No. 81-4, Decennial Census of U.S. Climate"

3.3.2.3.2 Area Emissions

The annual rate of air pollutant emissions in the area has been estimated by the Air Quality Control Section of the Oklahoma City - County Health Department. Oklahoma City is contained within Region 184, which consists of nine counties in Central Oklahoma.

Estimates of the annual rates of pollutant emissions in Region 184 in 1970 as published in the State Implementation Plan are listed in Table 3.3.2-D. More recent data have been obtained by the County Health Department, but only industrial sources with the potential to generate 100 tons/year or greater of uncontrolled emissions are listed. Since this includes only a small fraction of the total sources in the region, the older but more complete data in the State Implementation Plan have been used in this study.

No information is available on the distribution of emission sources in the Oklahoma City region. Because there are no concentrations of heavy industries in the area, an approximate model of this distribution can be made based on population densities. In addition, a 1971 study of air contaminant levels in the area done by the Oklahoma City-County Health Department* concludes that for pollutants such as suspended particulates the monitor data indicate a graduated decrease in levels as one travels away from downtown Oklahoma City. The study assumed that for suspended particulates the population density, along with its associated industry and automobile traffic, has a direct bearing on the pollutant levels. For impact assessment purposes, a direct relationship between emission distribution and population distribution can, therefore, be assumed in order to determine variations in emission densities within an area.

An emission distribution has, therefore, been formulated on the basis of relative ambient pollutant concentrations for Oklahoma City. The emission distribution consists of four zones surrounding downtown Oklahoma City shown in Figure 3.3.2-B. Emissions are assumed to be distributed uniformly within each zone, with emission densities proportional to relative ambient concentrations. On the basis of the air quality distribution study done by the Oklahoma City Health Department, the emission densities in zone I, the central Oklahoma City zone, are approximately 1.6 times as great as the densities in zone II, the area in which Tinker AFB is located. The emission densities in zone I are approximately four times greater than those in zone III and 5.5 time greater than those in zone IV. The emission densities as determined by this model are shown in Table 3.3.2-E.

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* "Air Contaminant Levels and Trends in Oklahoma County's Ambient Air," Oklahoma City-County Health Department Air Pollution Laboratory, 1971. This study actually indicates a localized zone of relatively high air contaminant levels including Tinker AFB. However, the dominant trend is for these levels to decrease with distance from the city center.

Table 3.3.2-D

Summary of Air Pollutant Emissions in the Central Oklahoma Region - 1970

Source Category	--------	Emissions 10^6 kg/yr	----------		
	CO	HC	NO_x	SO_x	Part.
I. Fuel Combustion					
A. Residential Fuel					
1. Dist. Oil	.01	.01	.02	.15	.02
2. Nat. Gas	.22	.09	.83	.01	.21
Total	.23	.10	.85	.16	.23
B. Commercial Inst. & Ind.					
1. Oil (area source)	.004	.06	1.19	1.42	.30
2. Resid. Oil (area source)	–	.01	.16	.83	.06
Resid. Oil (pt. source)	–	–	–	.03	–
3. Nat. Gas (area source)	.14	.34	1.77	.01	.26
(pt. source)	–	.21	8.92	–	.09
4. LPG (area source)	.35	.14	1.08	.24	.33
(pt. source)	–	.05	7.44	–	–
Total	.49	.81	20.55	2.53	1.05
C. Steam & Elect Power	.02	1.08	7.4	.36	.50
Total Fuel Combustion	.73	1.99	28.81	3.05	1.78
II. Process Losses (pt.)	.07	4.26	–	–	7.19
III. Transportation (area source)	324.13	69.56	38.32	2.27	3.57
Grand Total (area source)	324.86	70.99	43.37	4.93	4.75
Grand Total (pt. source)	.10	5.61	23.76	.39	7.79
Total	324.96	76.60	67.13	5.32	12.53

Source: "Implementation Plan", Oklahoma State Air Pollution Control Board, October 16, 1972.

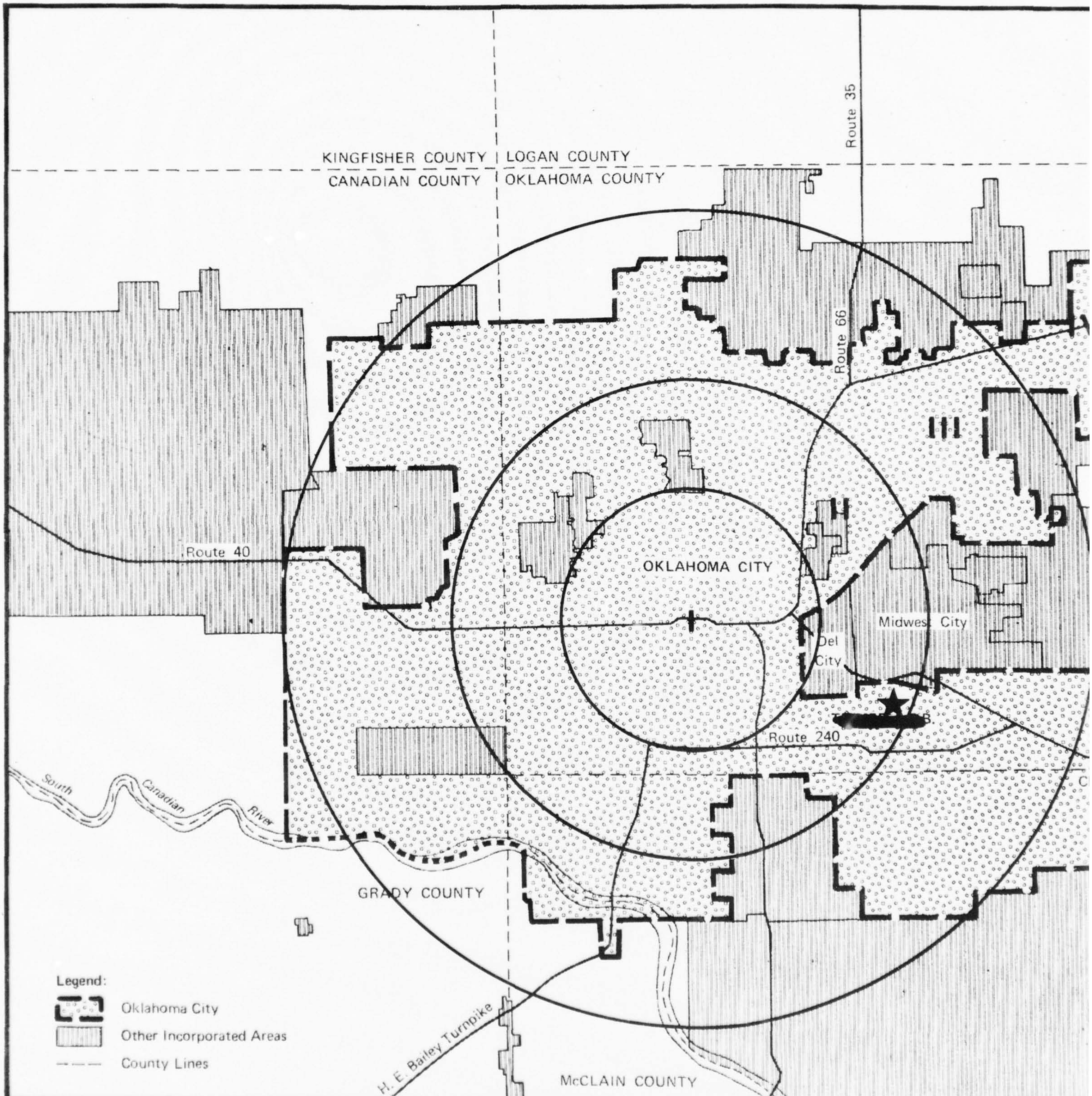

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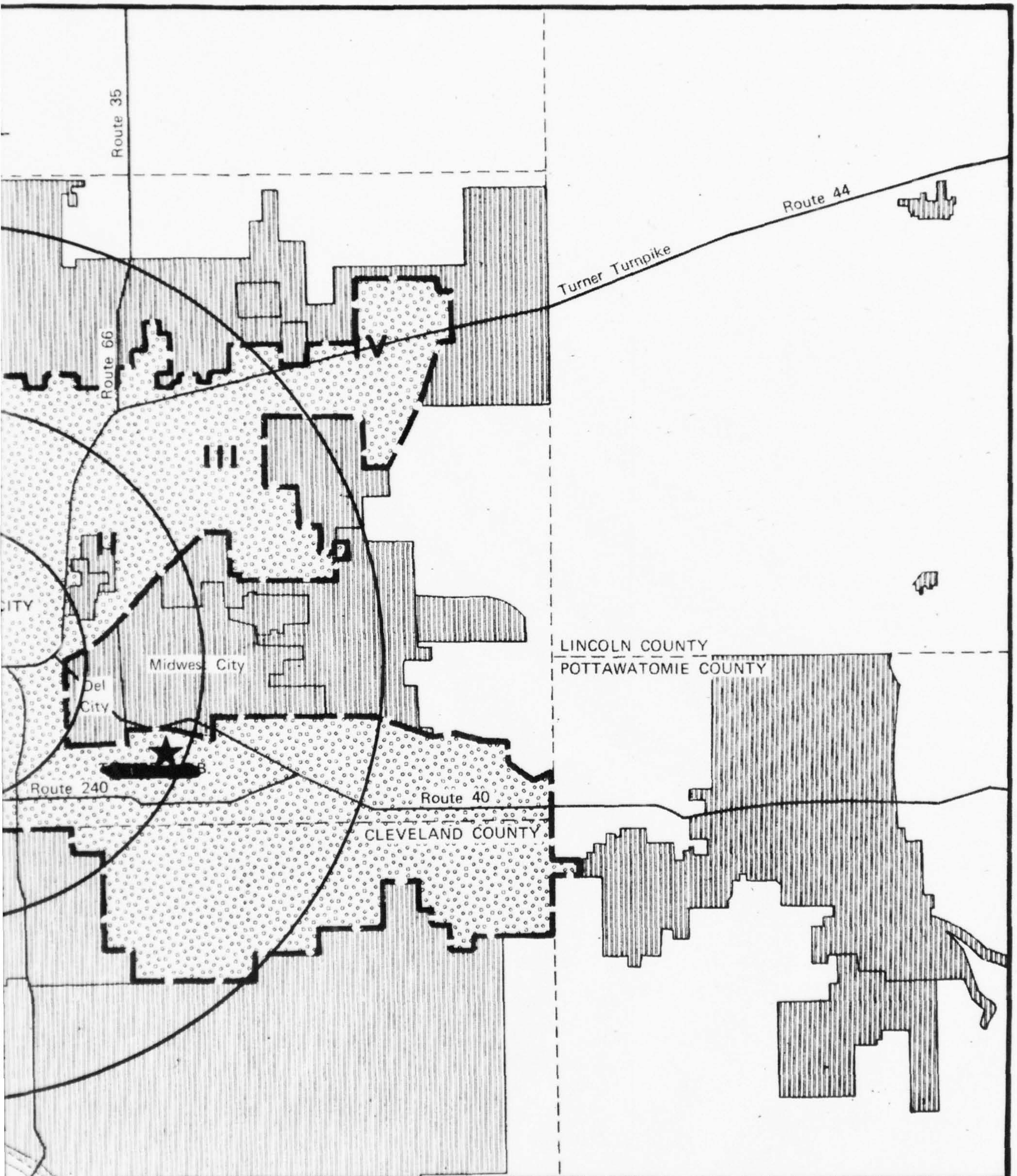
FIGURE 3.3.2–B REGIONAL EMISSION INVENTORY ZO



.2–B REGIONAL EMISSION INVENTORY ZONES

2

Table 3.3.2-E

Air Pollutant Emissions Densities
in Oklahoma City - 1970

Zone	Emission Density (10^3 kg/km^2 - yr)				
	CO	HC	NO_x	SO_x	Part.
I	354	84	73	5.8	6.8
II	226	53	47	3.7	4.4
III	90	21	19	1.5	1.7
IV	65	15	13	1.1	1.3

3.3.2.3.3 Air Quality

Ambient air quality in the area surrounding Tinker AFB has been monitored by the Air Quality Section of the Oklahoma City-County Health Department. Since 1969 as many as 23 monitor stations have been maintained in Oklahoma County, four of which are located around the base. The ambient levels from these four stations are listed in Table 3.3.2-F. The locations of the four sampling sites near the base as indicated in Figure 3.3.2-C are:

Station 10 - Northeast 10th and Douglas Blvd.
Station 20 - Ranger Station, Draper Lake
Station 21 - Southeast 74th and High Avenue
Station 6 - 300 Mid-American Blvd.

The highest annual geometric mean concentration of particulates recorded in 1973 at station 21 was 61 micrograms per cubic meter and is just above the secondary standard. However, some of the other monitor stations in the region have been as high as 93 micrograms per cubic meter, and particulate control in central Oklahoma has been designated as Priority I.

The seasonal trend for suspened particulate indicates that the highest readings occur during the spring because of high winds and the recent unusually dry spring periods. Because of the generally windy conditions along with extended dry periods, the average background level has been estimated to be greater than 30 micrograms per cubic meter. The State Implementation Plan indicates that the secondary standards will be attained through the continued enforcement of controls.

In the past ten years, the ambient air standards for carbon monoxide have not been exceeded. Recent data have indicated that carbon monoxide is currently not a problem for the area, but that readings have approached the 35 ppm maximum one-hour concentration.

The results of the 1972 monitoring of nitrogen oxides at two of the four stations surrounding the base indicate annual arithmetic means of 36 and 41 micrograms per cubic meter, which are well below the ambient standard of 100 micrograms per cubic meter. This pollutant does not, therefore, appear to be a problem for the area.

Photochemical oxidants have been considered priority I in the region. During the summer months, the ambient standard of .08 ppm for one-hour concentrations has been surpassed frequenty at some stations. In the vicinity of the base readings from stations 6 and 20 exceeded the .08 ppm standard more than once during June and July 1972 with a maximum one-hour concentration of .10 ppm. The State Implementation Plan indicates that reduced emissions through controls will result in attaining the standards.

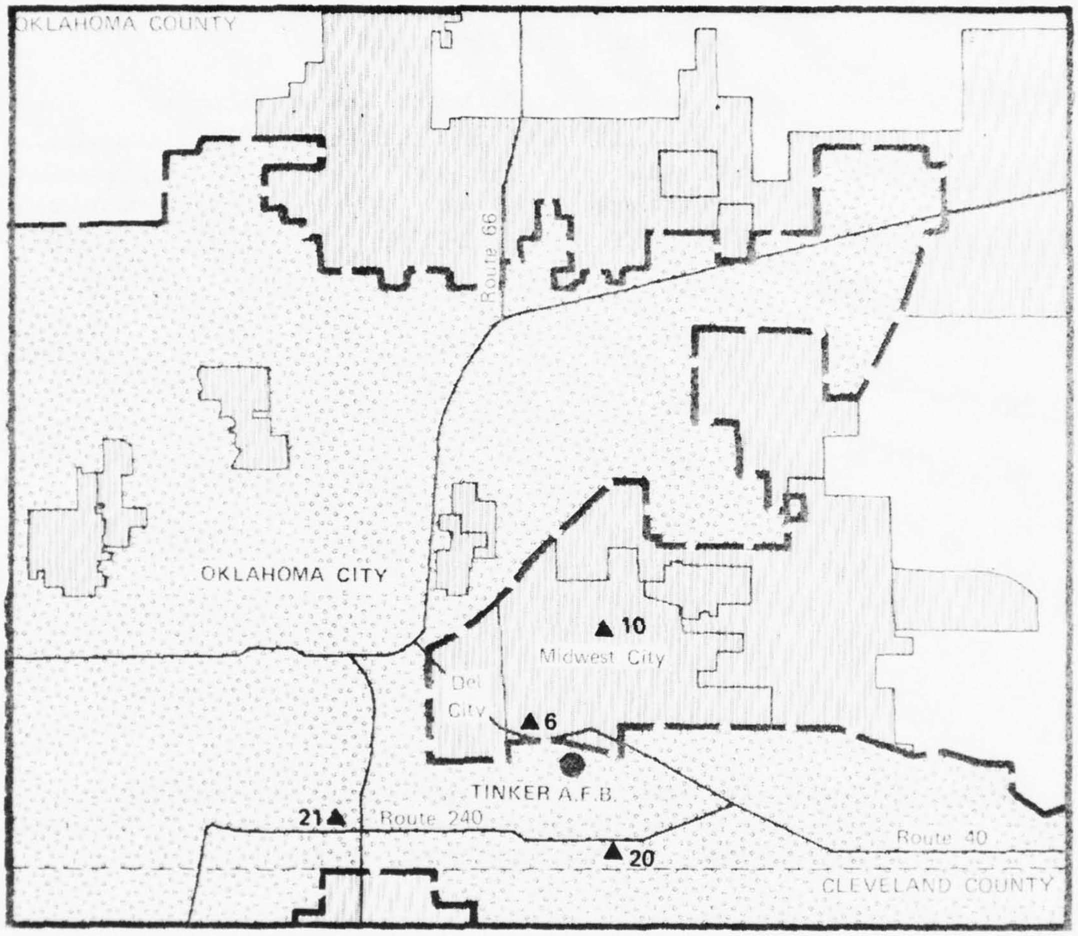
Hydrocarbons have not been monitored near the base and no recent results have been reported. However, the State Implementation Plan indicates that in 1970 maximum one-hour concentrations in the region reached levels as great as 235 micrograms per cubic meter. Rollback calculations indicate that a 31% reduction is required to meet the national standard. The Implementation Plan anticipates a reduction by 1975 and a 69% reduction in emissions by 1980 through control devices on automobiles. However, recent unpublished studies along with discussions with County Health Department personnel indicate that the 1975 deadline had not been met and that a transportation control plan may have to be considered.

Table 3.3.2-F

Ambient Air Pollutant Concentrations in the Vicinity of Tinker AFB

Station No.	Year	Ambient Air Pollutant Concentrations (micrograms per cubic meter) suspended particulate geom. mean	nitrogen oxides arith.mean	sulfur oxide	photochem. oxidants max 1-hr
6	1972	58	41	–	196 (.1 ppm)
10	1973	46		–	
20	1973	41		–	
21	1972	61	36	–	181 (.09 ppm)

Source: Oklahoma City County Health Department. "Air Quality Study in the Area of the Proposed General Motors Plant," Oklahoma City, Oklahoma: By the Department, 1974.



Source: "Air Quality Study in the Area of the Proposed General Motors Plant," Oklahoma City-County Health Department, 1973.

FIGURE 3.3.2-C LOCATIONS OF AIR MONITOR STATIONS NEAR TINKER AIR FORCE BASE (station numbers correspond to County Health Department designations)

Sulfur dioxide levels in the area are too low to be detected. The almost exclusive use of natural gas for both residential and industrial heating has resulted in relatively low ambient concentrations.

A general statement concerning the overall air quality in the Oklahoma City area would be that measured pollutant concentrations do not exceed National Ambient Air Quality Standards for SOx, NOx and CO. At the present time the standards for photochemical oxidents and particulates are exceeded. It is anticipated that there may be problems in exceeding the Ambient Air Quality Standard for hydrocarbons, since one hour maximums reach levels as great as 235 micrograms per cubic meter (Further studies are underway).

3.3.2.4 Present Impact of Tinker Air Force Base

3.3.2.4.1 Air Quality Impact

The impact on air quality resulting from current operations at Tinker AFB can be assessed by analysis of the emission data for the base and its environs presented in the preceeding sections. A qualitative analysis of these data is sufficient to indicate the significance of Tinker AFB emissions on both a regional and a local basis.

The regional impact of the base is indicated in Table 3.3.2-G in which the total emissions from the base are compared with the emissions from the Central Oklahoma Region. The total base emissions include emissions from aircraft flight operations (below 3000 feet above ground level), as well as emissions from ground operations at the base. These emissions are distributed widely--though not uniformly--throughout the region so that the base can be regarded as a contributor to the regional pollutant burden. The comparison in the table provides a reasonably valid measure of the impact of the base on regional air quality. As indicated, the emissions from Tinker AFB operations represent between 0 and 3 percent of the total regional emissions in the various emission classes. These contributions are small and are of minor significance with respect to the problems of regional air quality control.

The local impact of Tinker AFB emissions can be deduced from Table 3.3.2-H in which emission densities at the base are compared with emission densities for the Central Oklahoma Region. The emission densities at the base are calculated from emissions resulting from ground operations only since emissions from flight operations do not have a localized impact at the base. The regional emission densities are given for the geographic zones that were defined earlier. As indicated in the table, emission densities at the base for all pollutant classes except SOx are of the same magnitude as the emission densities within Zones I and II of the Region. It can be concluded, from this comparison that Tinker AFB, on the average, is not an area of high emission densities in the Region and that the average air quality at the base is comparable to the air quality that presently exists in the central and intermediate zones of the Region.

Table 3.3.2-G

Current Contribution of Tinker Air Force Base to
CENTRAL OKLAHOMA AIR QUALITY CONTROL
REGIONAL AIR POLLUTANT EMISSIONS

Source	CO	HC	NO_x	SO_x	Part.
All sources in Central Oklahoma Region - 1970 (10^6 Kg/yr)	325	76.6	67.1	5.32	12.5
Tinker AFB Emissions - 1974* (10^6 Kg/yr)	1.4	1.2	0.88	0.12	0.09
Tinker AFB Emissions as percent of regional total	0.4	1.6	1.3	2.2	0.7

*Includes aircraft flight operations below 3000 ft altitude.

Table 3.3.2-H

Current Air Pollutant Emission Densities at Tinker AFB and in the Central Oklahoma Air Quality Control Region

Zone	Emission Density (10^3 Kg/Km^2-yr)				
	CO	HC	NOx	SOx	Part.
Tinker AFB* (1974)	81	71	44	6.6	4.8
Zone I	354	84	73	5.8	6.8
Zone II**	226	53	47	3.7	4.4
Zone III	90	21	19	1.5	1.7

*Based on emissions from ground operations only.

**Tinker AFB is located in Zone II.

The emission density data alone are not sufficient to determine whether localized areas exist within the base where excessive pollutant concentrations exist. As indicated in Table 3.3.2-G, the distribution of emissions within the base is highly non-uniform, and it is possible that air quality in localized areas within the base differs markedly from the average base air quality. Variations of air quality can be determined either by conducting a detailed pollutant dispersion analysis or by conducting an air quality measurement program.

3.3.2.4.2 Esthetic Impact

Operations of certain types of aircraft produce visible smoke plumes at airports due to the emission of small quantities of unburned carbon in the engine exhaust during takeoff and climbout operating modes. These smoke plumes have no physical impact on air quality since the actual content of the carbonaceous particulate material is small and is widely dispersed before it reaches the ground. However, in some situations the plumes may be an annoyance of local residents and, therefore, have an esthetic impact.

The B-52 is the only aircraft operating regularly at Tinker AFB that emits highly visible smoke plumes, and the number of flights by this aircraft is relatively small. It is likely that visible plumes also are emitted by certain transient aircraft at the base, but these instances are both irregular and infrequent. Consequently, it can be concluded that visible smoke plumes do not represent an adverse impact of base operations. This conclusion is substantiated by the fact that no complaints directed at visible smoke have been received by the base.

3.3.3 AIRCRAFT NOISE AND ACCIDENT POTENTIAL (AICUZ)

3.3.3.1 Background

Federal legislation, national sentiment, and other external forces that directly affect the Air Force mission have greatly increased the Air Force role in environmental and planning issues. Problems of airfield encroachment, noise, and social and economic impacts dictate direct Air Force participation in the process of comprehensive community and land use planning. Effective coordinated planning that bridges the gap between the federal government and the local citizen requires the establishment of good working relationships with local communities and planning officials; such a relationship in turn, depends upon creating an atmosphere of mutual trust and helpfulness.

In the interest of public health, safety, and general welfare, the Air Installation Compatible Use Zone (AICUZ) concept has been developed by the Air Force in order to encourage appropriate control and regulation of the growth and development of the land area close to military airports and concurrently to prevent degradation of Air Force mission capability resulting from potential urban encroachment on such airports. This concept embodies a process of projecting, mapping, and defining aircraft noise and accident potential areas in the air base environs. Land use compatibility guidelines are then applied to these areas. These serve as the basis for Air Force recommendations on land use planning and control by the community.

A land use compatibility program for Air Force Installations was actually initiated in 1971 as the Greenbelt Program. In 1972 the AICUZ was established as a further evolution of the Greenbelt concept. Since that time, experience in AICUZ application, coupled with increasing national interest in protecting and enhancing our environment, has resulted in refinements of the initial concept. Recent applications of the AICUZ approach and its acceptance by local communities indicates that it is a rational basis for compatible land use planning in airport environs.

Air Force commanders at the major command and base level establish and maintain active programs to achieve the maximum feasible land use compatibility between air installations and neighboring communities. The program requires that all appropriate governmental bodies and citizens be kept informed of Air Force views whenever AICUZ or other planning matters affecting the installation are under consideration. This involves:

- Providing information, criteria and guidelines to state, regional and local planning bodies, civil associations and similar groups;
- Informing such groups of the requirements of the flying activity, noise exposure, aircraft accident potential and AICUZ plans;

- Describing the noise reduction measures that are being used; and

- Insuring that all reasonable, economical and practical measures are taken to reduce or control Air Force noise-producing activities. These measures include such considerations as proper location of engine test facilities; providing sound suppressors where necessary; and adjustment of flight patterns and/or techniques to minimize the noise impact on populated areas. This must be done without jeopardizing safety or operational effectiveness.

The AICUZ program designates Accident Potential Zones (APZ) and Noise Zones (NZ) and provides land use compatibility guidelines for these zones. The APZ's and NZ's are overlayed on base drawings to create Compatible Use Districts (CUD), which are the basic planning units of the AICUZ program. Local communities, by combining the CUD land use guidelines with other factors and considerations not directly related to aircraft operations, may develop composite guidelines to form the basis for a comprehensive land use plan.

As part of the USAF AICUZ program, the only real property interest in which the United States Air Force requests Congressional approval to acquire is the area designated as the Clear Zone. Real property interests may be acquired by fee or as an easement giving the Air Force control over the use of the property. Fee land so acquired may be made available for outleasing for agricultural or grazing purposes.

3.3.3.2 Noise Related to Current Aircraft Operations

A general discussion of noise measures and noise exposure methodology developed specifically for aircraft operations is presented in Appendix C. As indicated there, the noise environment is related to the types of aircraft, the number of operations for each aircraft type, and the distribution of these operations among the various runways, flight patterns, and the time of day. Aircraft operations of interest in this regard at Tinker AFB include sorties (takeoff and landing), go-arounds (touch-and-go), and engine runups used for maintenance, power check, and trim purposes. A complete listing of these operational data, flight track patterns, runway usage, and runup activity and locations have been given in Section 3.1 of this statement.

3.3.3.2.1 Flight Operation Noise Data

The basic noise source data for each of the airport operations of each aircraft have been obtained in terms of Sound Exposure Levels, SEL, as a function of both ground-to-ground range and air-to-ground range. These data were obtained for both approaches, takeoffs and level flyovers. For some aircraft, data are required for both afterburner and military power (i.e., nonafterburner) takeoffs.

The ground-to-ground data are used for the aircraft ground-roll portion of the operation, while air-to-ground data are used when the aircraft is airborne (actually, when the elevation angle from the observer exceeds about seven degrees). The ground-to-ground data are also used in the assessment of the noise impact due to engine runup operations.

The specific aircraft operations and flight path and runway procedures are in accordance with Tinker Air Force Base Regulation 60-1, included as Appendix G. Many of these regulations are specifically prescribed to minimize noise due to traffic patterns and terminal area procedures.

A typical set of the noise data is shown in Figure 3.3.3-A for the air-to-ground data associated with takeoff and approach operations for the A-4 aircraft.

3.3.3.2.2 Noise Exposure Contours

The noise contours for the current Tinker AFB aircraft flight and ground operations are shown in Figure 3.3.3-B. As indicated, the contours, which are based on the Day-Night Average Sound Level, L_{dn} methodology, show that the primary contributors to the noise environment are the Runway 17-35 operations. The effect of runup activities is to produce some perturbations that increase the width of the contours in the east-west directions. Superposition of the flight tracks and the resulting noise contours, shown in Figure 3.3.3-C illustrates the relationship of these tracks to the noise contours.

3.3.3.3 Accident Potential Related to Current Aircraft Operations

3.3.3.3.1 Development of Methodology

The original formulation of the hazard potential due to aircraft accidents was carried out by the Air Force in 1972 utilizing accident data for the T-37 and T-38 aircraft. In mid-1973 as an extension of this approach, the Air Force performed an Air Force-wide accident hazard study using a larger data base to identify land areas near military airports having significant aircraft accident potential. This study involved the review of 369 major aircraft accidents that occurred within a ten-mile radius of airfields and which were directly related to airfield-associated in-flight mishaps. These accidents occurred over a five-year period from 1968 to 1972, and included all types of Air Force aircraft.

From this statistical evaluation, three zones have been defined in relation to the runway geometry within which the aircraft accident hazard potential is sufficiently high to warrant some form of land use restrictions.

The size and location of these zones are assumed to be the same for all military airports, i.e., the zone sizes have not been related to airport activity (number and type of aircraft operations). The statistical analysis has further indicated that the size and shape of the three hazard zones are the same for all aircraft types except fighter aircraft, in which case the zone closest to the runway is somewhat narrower in width.

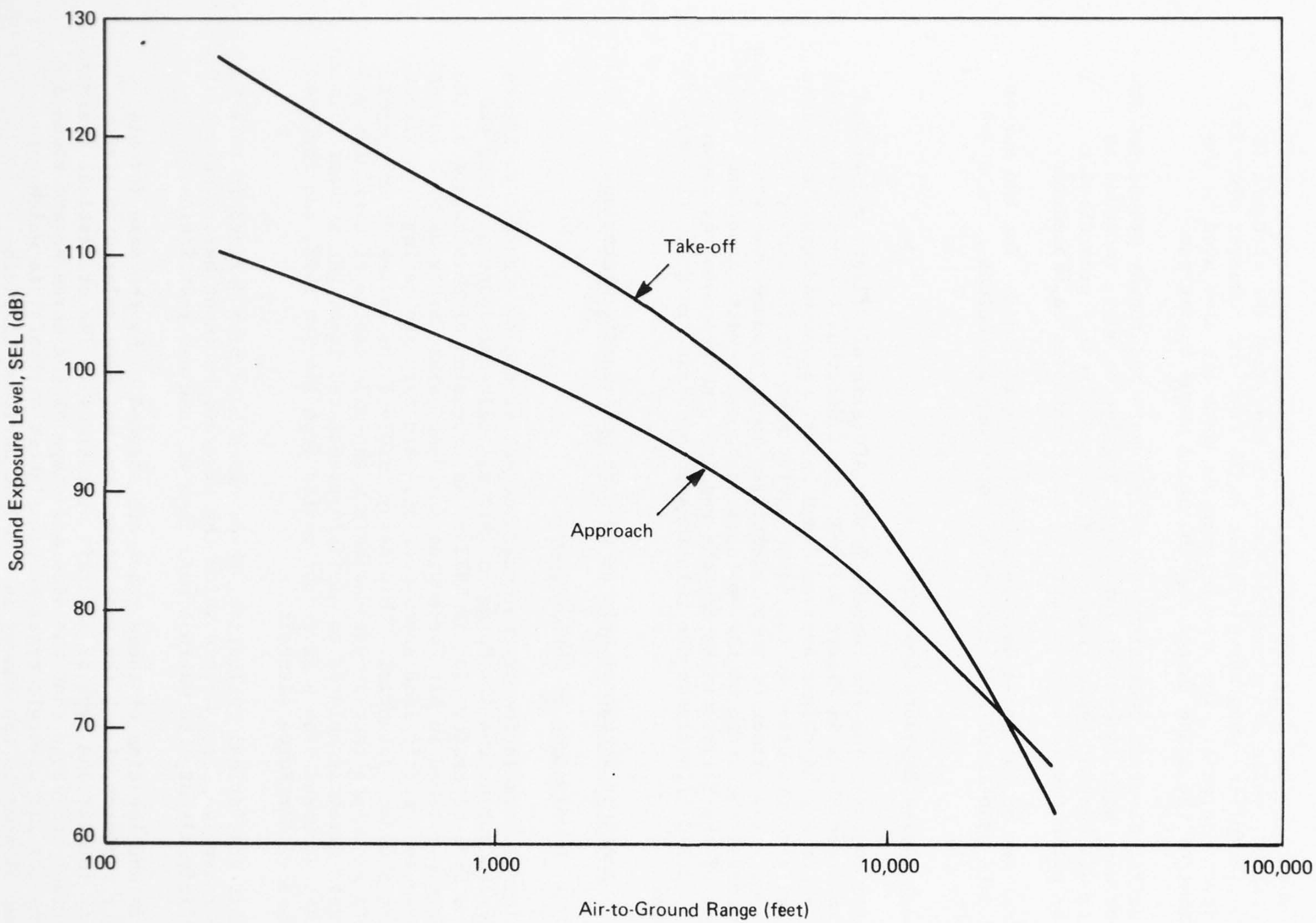
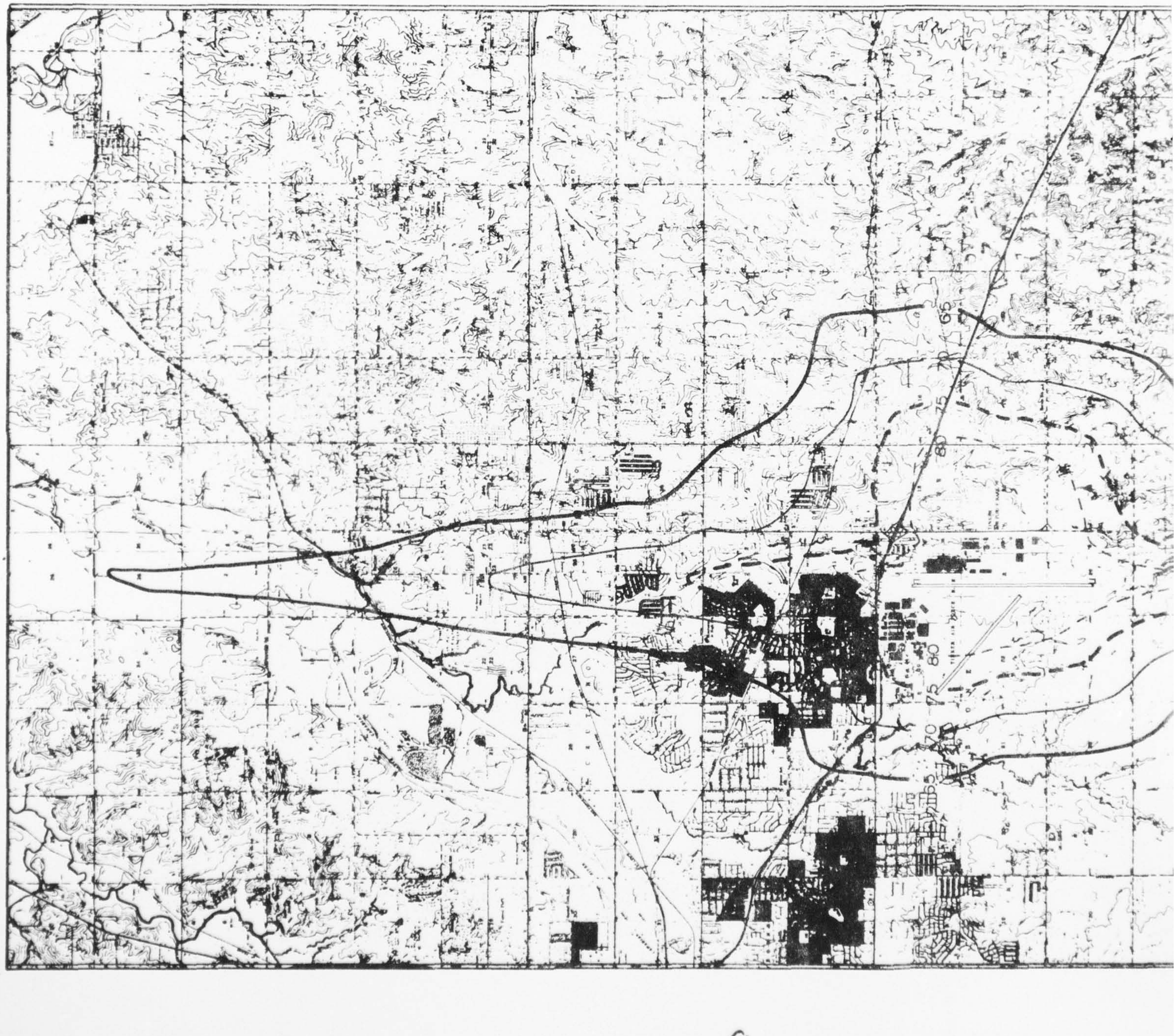


FIGURE 3.3.3-A SOUND EXPOSURE LEVEL VS. RANGE – A-4 AIRCRAFT



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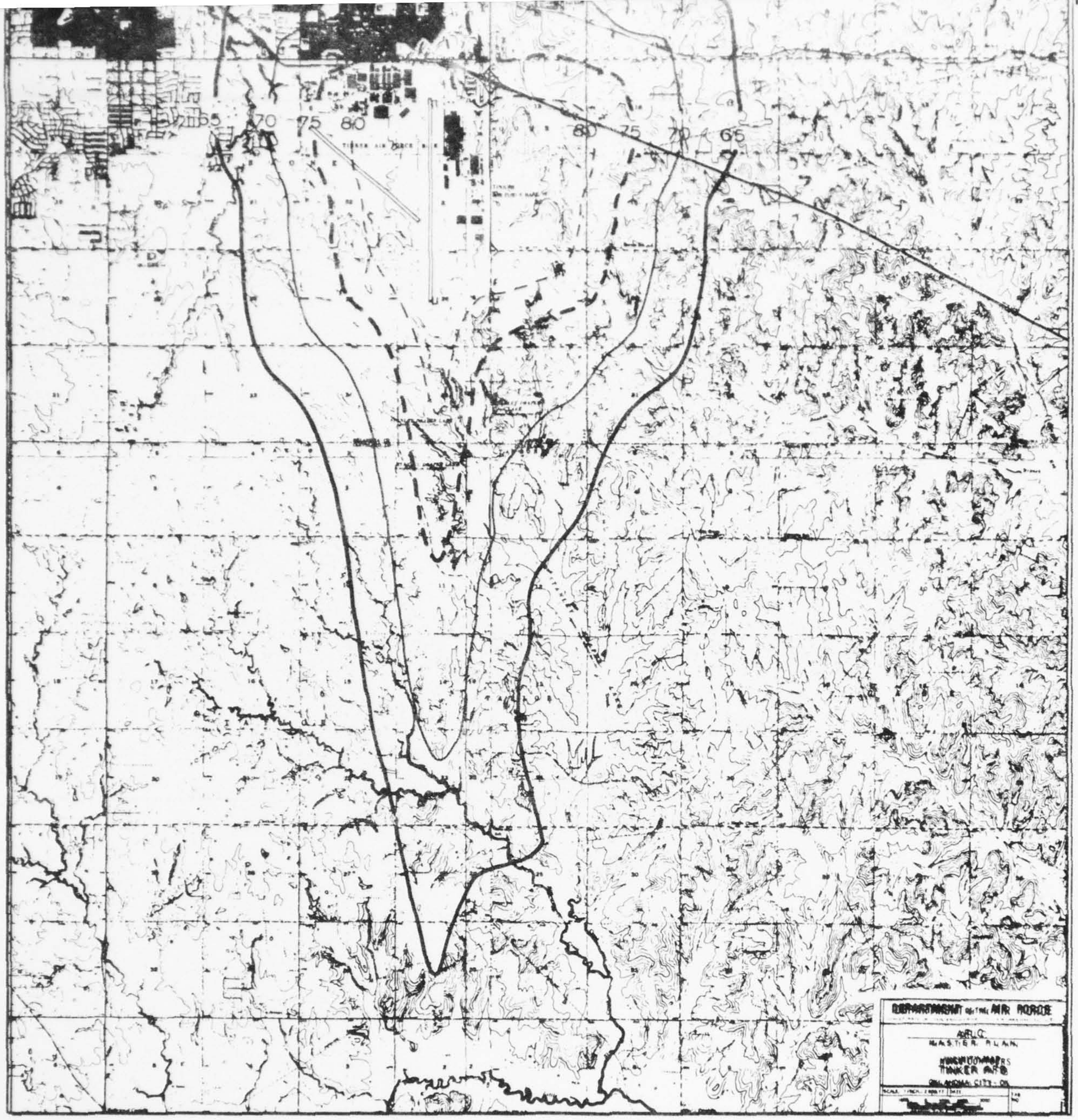

FIGURE 3.3.3–B DAY-NIGHT SOUND LEVEL CONTOURS, TINKER AFB, PRESENT MISSION – 1975

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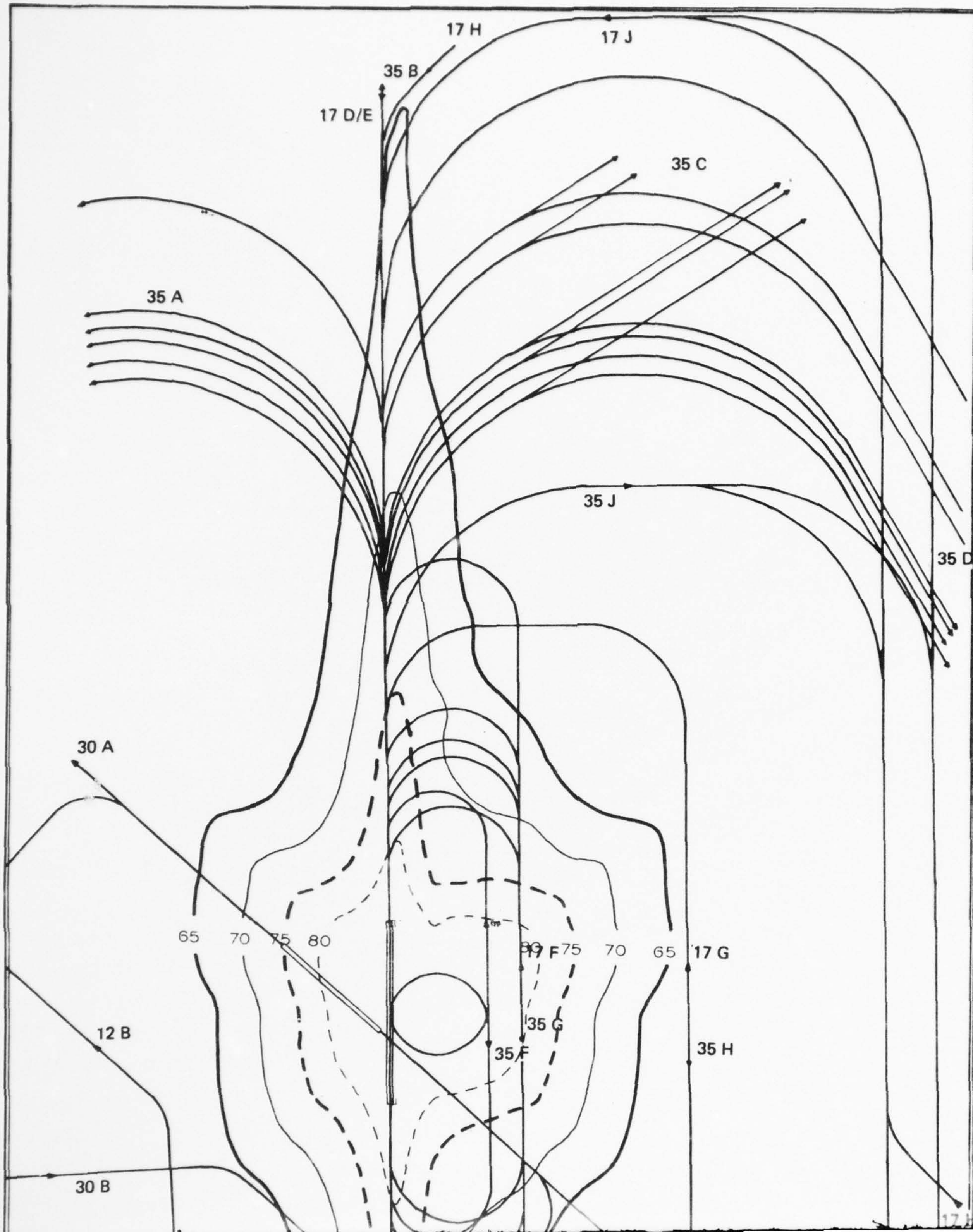

17 H
17 J
35 B
17 D/E
35 C
35 A
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65
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35 F
35 H
30 B

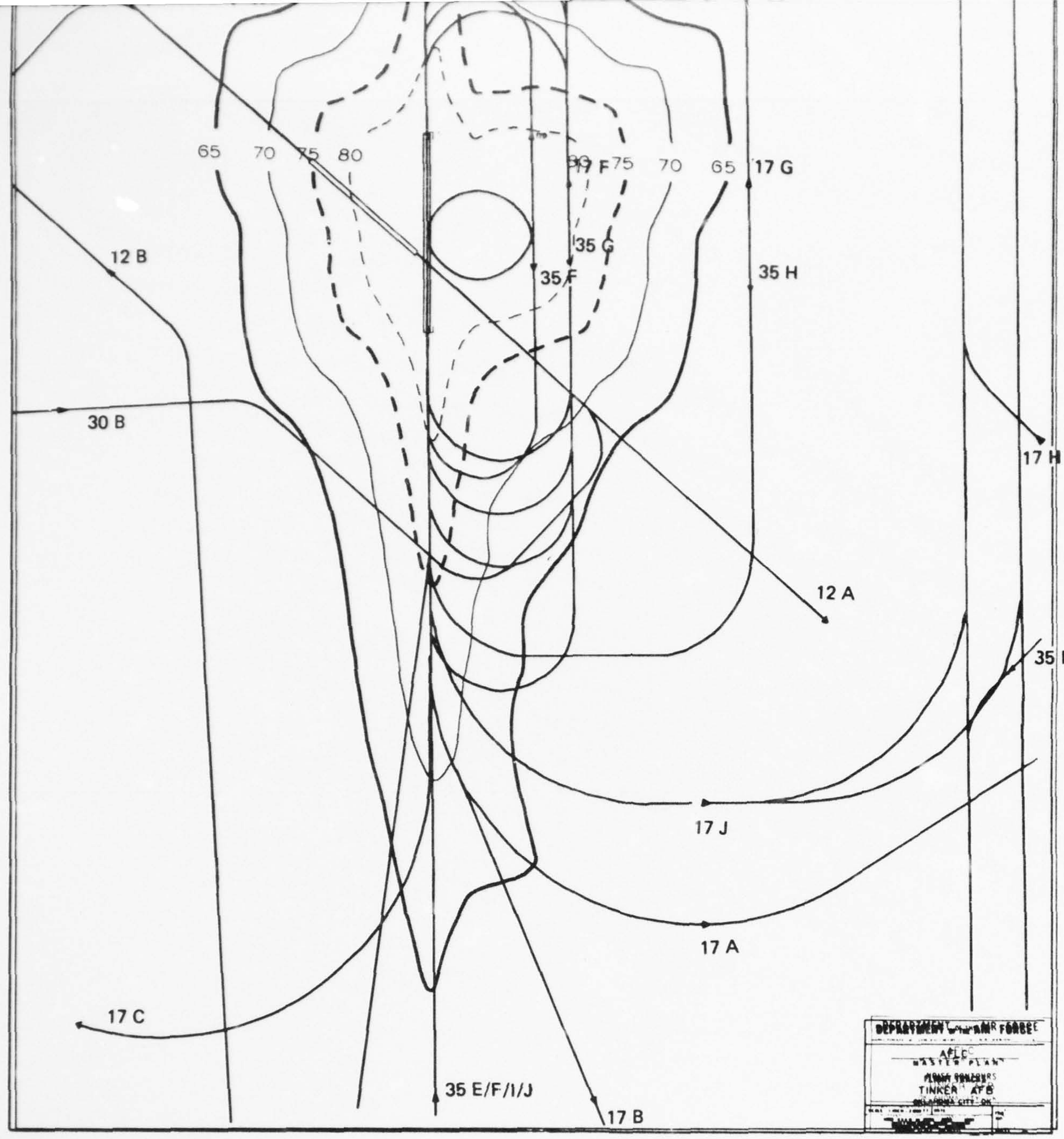


FIGURE 3.3.3–C DAY-NIGHT SOUND LEVEL CONTOURS SUPERIMPOSED ON FLIGHT TRACK PATTERNS, TINKER AFB, PRESENT MISSION – 1975

3.3.3.3.2 Accident Zones and Land Use Compatibility

The accident zones defined by the AICUZ statistical survey of aircraft accidents include a Clear Zone and Accident Potential Zones I and II. The Clear Zone extends a distance of 3,000 feet from the runway threshold; Accident Potential Zone I (APZ I) extends an additional distance of 5,000 feet beyond the Clear Zone; and Accident Potential Zone II (APZ II) extends an additional distance of 7,000 feet beyond Accident Potential Zone I. Each of these zones is 3,000 feet wide so that the total area at the end of each major runway within which the accident potential is considered to be significant is 3,000 feet wide and 15,000 feet long.

Within the Clear Zone, which has the most critical accident potential, all land uses are prohibited (i.e., incompatible) except for the following: agriculture, permanent open space, water areas, transportation rights-of-way, communication and underground utilities, and necessary navigational aids or operational facilities.

The acceptable land uses within Accident Potential Zone I include agriculture; recreational uses; open spaces; transportation, communication and utility uses; wholesale trade; and some types of industry and manufacturing. Generally, land uses that concentrate people in small areas are not compatible.

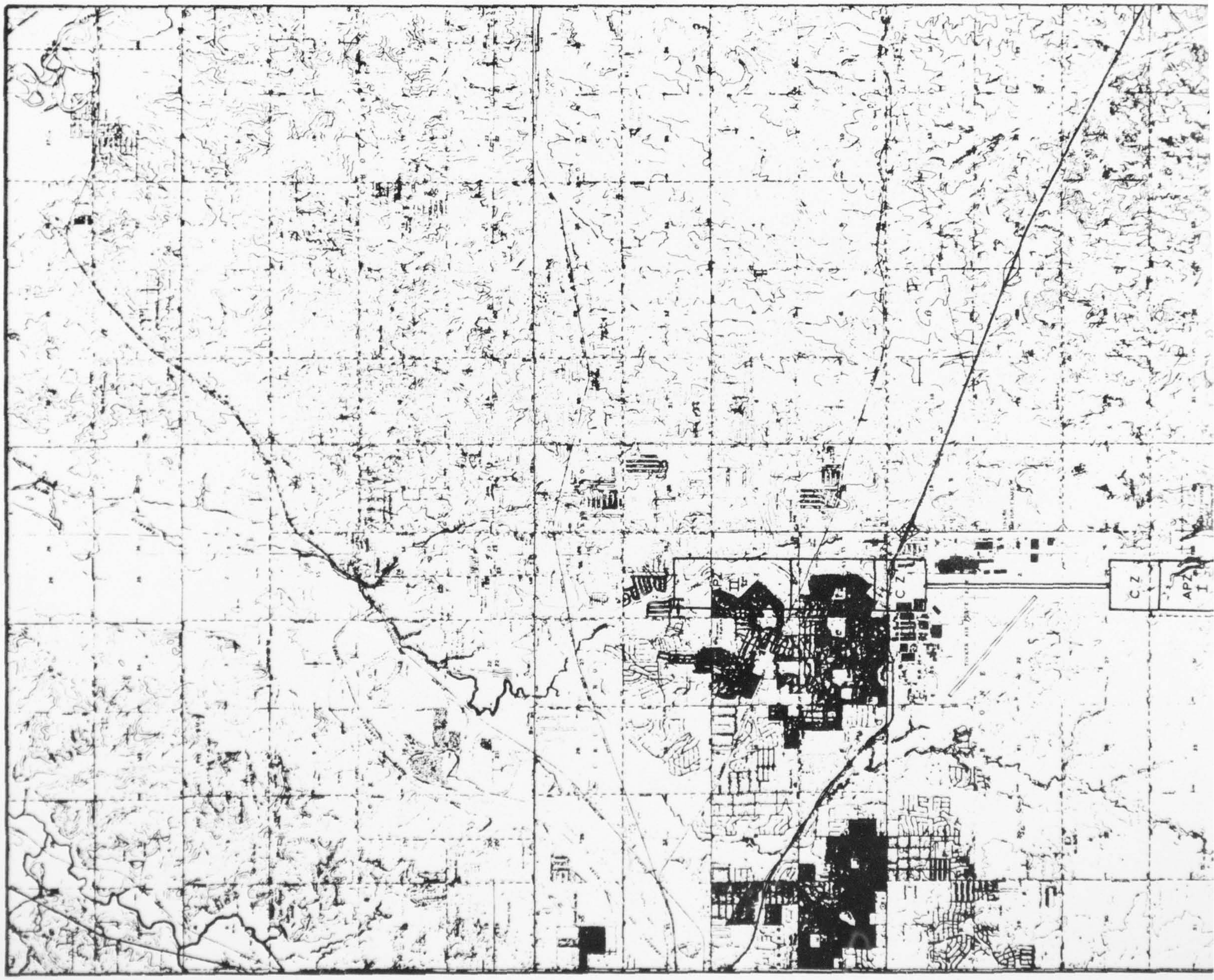
The acceptable land uses in Accident Potential Zone II include all of those allowed in Zone I plus low-density single family residences, various personal and business services, and commercial retail trade uses of low population density. High-density uses such as schools, churches, restaurants, and multi-story buildings are not compatible according to this concept.

3.3.3.3.3 AICUZ Accident Potential Zones at Tinker AFB

The mapping of the three AICUZ aircraft accident potential zones in relation to the major north-south runway system for the present mission at Tinker AFB is shown on Figure 3.3.3-D. As shown, the zones extending to the south are over uninhibited areas, principally the watershed of the Stanley Draper Lake and portions of the lake itself. The Clear Zone extending to the north includes 32 housed units (approximately 100 residents) and 11 business establishments, all located on approximately 60 acres. The Air Force currently has plans to acquire these properties as well as about 129 acres of undeveloped land within the South Clear Zone. In the Northern APZ II there are also a substantial number of housing units and residents. The APZ I Zone to the north encloses the land acquisition area from which all the dwelling units and public buildings are being removed (see Section 3.5.2).

3.3.3.4 Aircraft Noise and Accident Potential Impact

The principal measures of the extent of the impact on the surrounding community due to the noise exposure and accident hazard potential are the number of inhabitants, the number of schools and the school population, the number of hospitals, and the number of housing units within each of the compatible use districts (CUD). As previously described, the CUD are composites of the Accident Potential Zones, as given on Figure 3.3.3-D, and the Noise Exposure Contours, shown on



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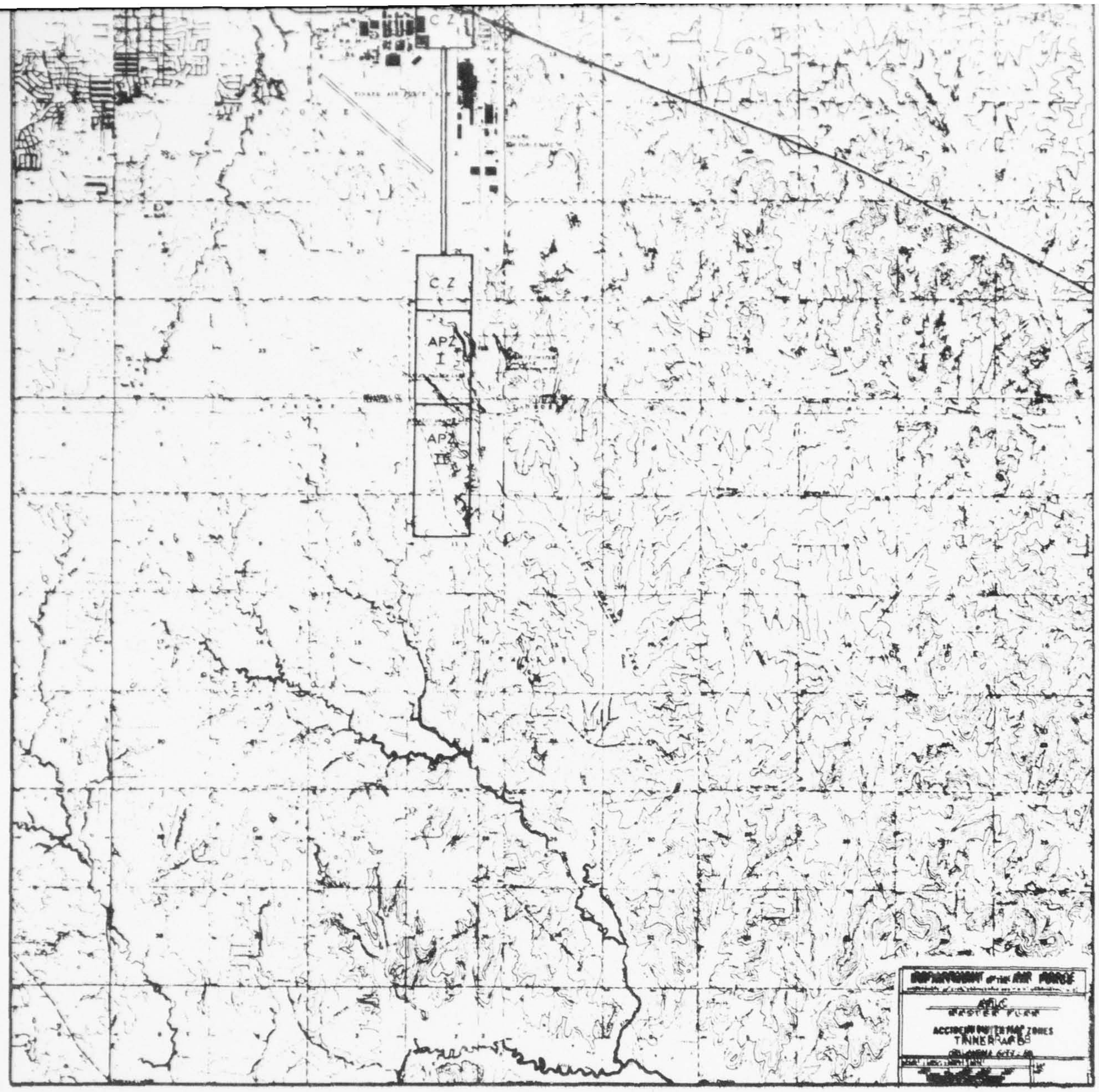

FIGURE 3.3.3–D AICUZ ACCIDENT POTENTIAL ZONES – PRESENT MISSION, TINKER AFB – 1975

Figure 3.3.3-B for the present mission at Tinker AFB. A map of the Tinker area showing the CUD zones defined by this superposition for the present mission is given in Figure 3.3.3-E.

Estimates of each of these impact measures have been made for each of the applicable CUD categories. * The population and housing estimates were based on interpolations of the traffic zone data, prepared for 1971 and projected to 1995, obtained in pre-publication form from the Association of Central Oklahoma Governments. These data represent an update of the information given in the 1968 *Oklahoma City Area Regional Transportation Study* [31]. Additional information on housing for Midwest City was obtained from the series of detailed land-ownership maps prepared by the University of Oklahoma for the Oklahoma Department of Commerce and Industry [67].

School and hospital locations were obtained from U.S. Geological Survey maps, city maps, and address information. School enrollment data were established from published reports [17] and from information obtained directly by contacts with the local school departments.

The magnitude of each of these measures of impact based on current (1975) and projected (1981) population and school enrollment date is shown on Tables 3.3.3-A and 3.3.3-B, respectively. The population impact estimates, in keeping with current practices, are defined by residential data. Thus, the non-resident work force at Tinker AFB, numbering currently approximately 25,000 is not included in the estimates of impacted population.

Comparisons of these tabulated measures of impact with the AICUZ Land Use Compatibility Guidelines, as given in Appendix D, indicates there is a substantial amount of incompatible land use activities relation to the present operations at Tinker AFB. One school, Steed Elementary, in Midwest City, is within an incompatible area (Accident Potential Zone II). Seventeen other schools, three hospitals, and one nursing home are located within CUDs for which compatibility is conditional upon particular levels of noise reduction achieved by the building structures. Residences in CUDs defined by L_{dn} of 75 or more are incompatible; according to Table 3.3.3-A, an estimated total of 4730 inhabitants and 1507 dwellings are within the L_{dn} contour.

Residences in CUDs defined by L_{dn} between 65 and 75 are, similarly, conditionally acceptable depending on the noise reduction achieved by the residential structure. For the present mission, approximately 41,436 residents occupy 11,358 housing units within such areas. No survey was conducted to determine how many and what type buildings now meet the required degree of noise reduction indicated in the AICUZ compatibility guidelines.

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*Note that CUD categories, 1,4,5,8 and 11 do not apply to the Tinker AFB present mission.

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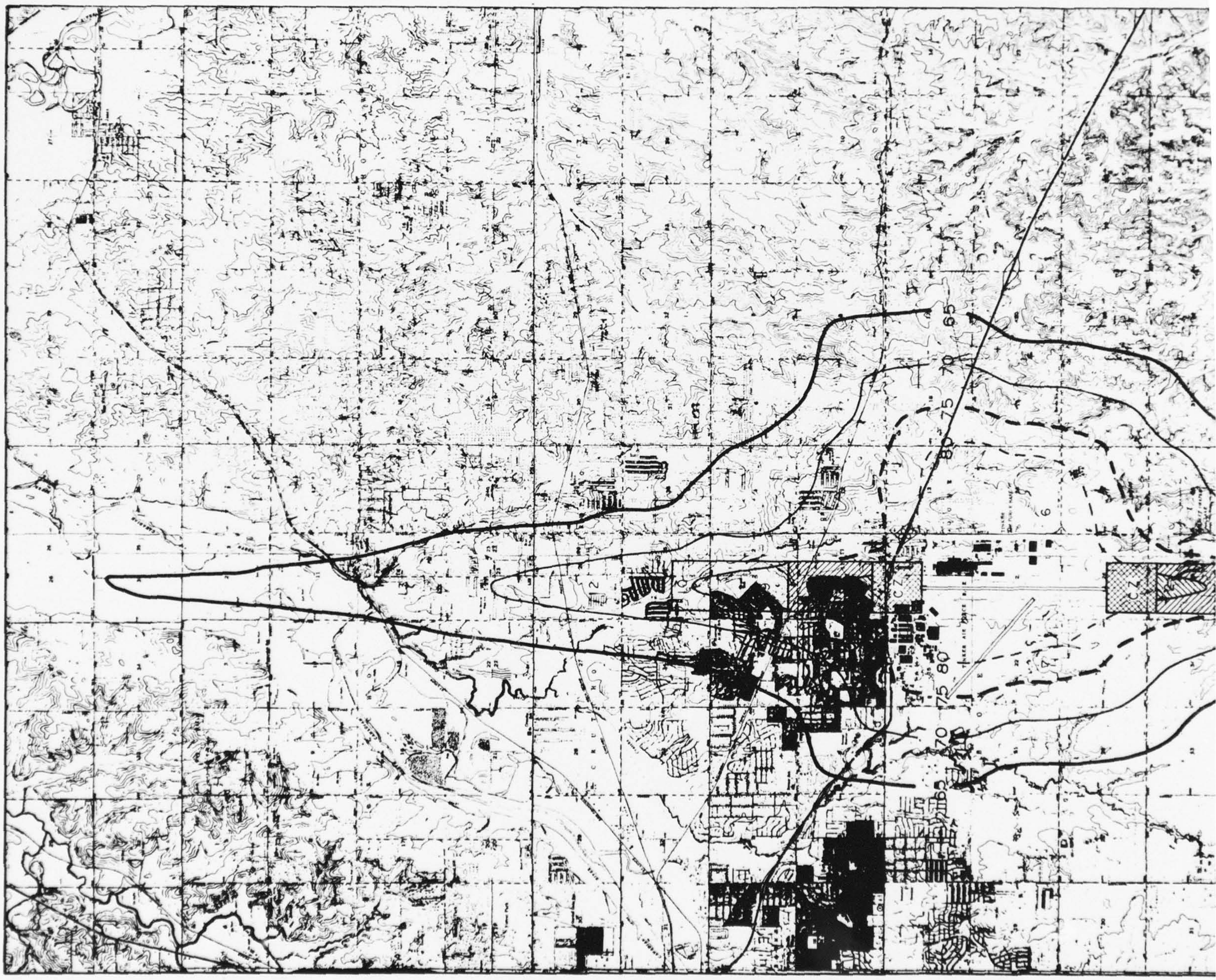

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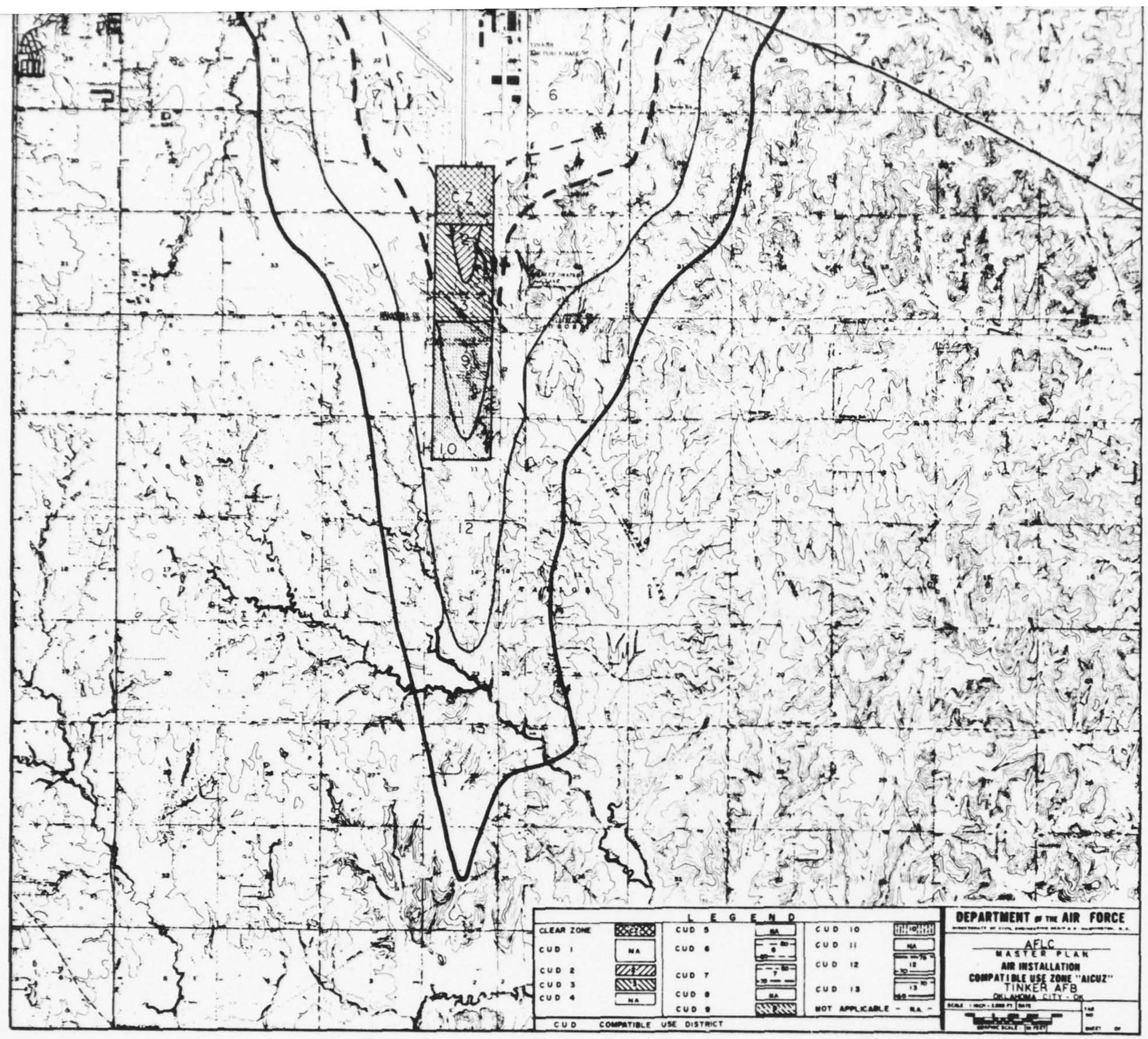

FIGURE 3.3.3–E AICUZ MAP FOR PRESENT MISSION, 1975, TINKER AFB

Table 3.3.3-A

AICUZ Impact - Present Mission at Tinker AFB - 1975 Time Period Statistics

Compatible Use Districts (CUD)

	2	3	6	7	9	10	12	13
Impact Measure	Ldn 80-85 APZ I	Ldn 75-80 APZ I	Ldn 80-85	Ldn 75-80	Ldn 75-80 APZ II	Ldn 70-75 APZ II	Ldn 70-75	Ldn 65-70
Inhabitants	0	0	1082	1921	1727	2762	14,618	24,056
Schools	0	0	0	0	1*	0	8**	9***
Students	0	0	0	0	449	0	4902	13,944
Hospitals	0	0	0	0	0	0	0	4†
Housing Units	0	0	324	681	502	772	4019	6567

* Steed Elementary School

** Willowbrook, West Side Elementary, East Side Elementary, Carl Albert Junior and Senior High, Jarman Junior High, Barnes Elementary, Soldier Creek Elementary Schools.

*** Star Spencer High, Roger Middle, Oscar Rose Junior College, Monroney Junior High, Star, Vocational Technical, County Estates, Midwest City High, Tinker Schools.

† Coyne Campbell, Midwest City Memorial, and Tinker Hospitals; Four Seasons Nursing Home

Table 3.3.3-B

AICUZ Impact - Present Mission at Tinker AFB - 1981 Time Period Statistics

Compatible Use District (CUD)

Impact Measure	2	3	6	7	9	10	12	13
	Ldn 80-85 APZ I	Ldn 75-80 APZ I	Ldn 80-85	Ldn 75-80	Ldn 75-80 APZ II	Ldn 70-75 APZ II	Ldn 70-75	Ldn 65-70
Inhabitants	0	0	901	1812	1764	2872	15,552	26,904
Schools	0	0	0	0	1*	0	8**	9***
Students	0	0	0	0	500	0	5446	18,554
Hospitals	0	0	0	0	0	0	0	4†
Housing Units	0	0	266	631	525	824	4431	8079

* Steed Elementary School

** Willowbrook, West Side Elementary, East Side Elementary, Carl Albert Juniro and Senior High, Jarman Junior High, Barnes Elementary, Solider Creek Elementary Schools.

*** Star Spencer High, Roger Middle, Oscar Rose Junior College, Monroney Junior High, Star, Vocational Technical, County Estates, Midwest City High, Tinker Schools

† Coyne Campbell, Midwest City Memorial, and Tinker Hospitals; Four Seasons Nursing Home

3.3.3.5 Land Use Within Aircraft Noise and Accident Potential Areas

Application of the Air Force AICUZ methodology to both the present and proposed missions at Tinker AFB shows an effect on land areas in Oklahoma and Cleveland Counties. Under the present mission, this includes land within the political jurisdictions of Midwest City, Oklahoma City and Spencer.

The land areas within the AICUZ Compatible Use Districts (CUD) under the present mission are shown in Figure 3.3.3-B. Incompatible land use as defined by the AICUZ Land Use Compatibility Guidelines, Appendix D, may be determined by comparing a given land use with a given CUD. For example, residential development is considered an incompatible land use under the AICUZ methodology within CUD 2,3,6,7 and 9, both north and south of Tinker AFB. Land use within the AICUZ, with the exception of the area of Midwest City to the north and northwest of Tinker AFB, is generally undeveloped land with only scattered residential development. Oklahoma City has control over large areas of land in the south approach zone to Tinker AFB and intends only low-level development south of the base. Lake Stanley Draper and the proposed West Elm Creek Reservoir occupy the major portion of the exposed area south of the base.

The area to the north and northwest of Tinker AFB is under intensive development as described in Section 3.5.2.3, Existing Land Use and Land Use Trends, as shown in Figure 3.5.2-D. The application of the AICUZ methodology to the present mission shows the most affected area to be that of Midwest City with 38% (6985 acres) of its area exposed. The area of Midwest City represents the highest population density within the contours. For these reasons, land use in Midwest City will be emphasized in the following discussion.

In Figure 3.3.3-F, the AICUZ methodology has been superimposed over a generalized land use map of Midwest City.* In order to estimate the amount of existing incompatible land use, as defined by AICUZ Land Use Compatibility Guidelines, Appendix D, the approximate acreage in four categories of land use was determined for each of the eight CUD zones. As the source of land use data is from a generalized land use map based on 1968 field surveys of Midwest City and not from field surveys based on the the current situation, the ensuing quantitative data is only intended to give an approximation of the land use incompatibility that exists under the present mission. The approximate acreage in the four categories of land use is presented in Table 3.3.3-C.

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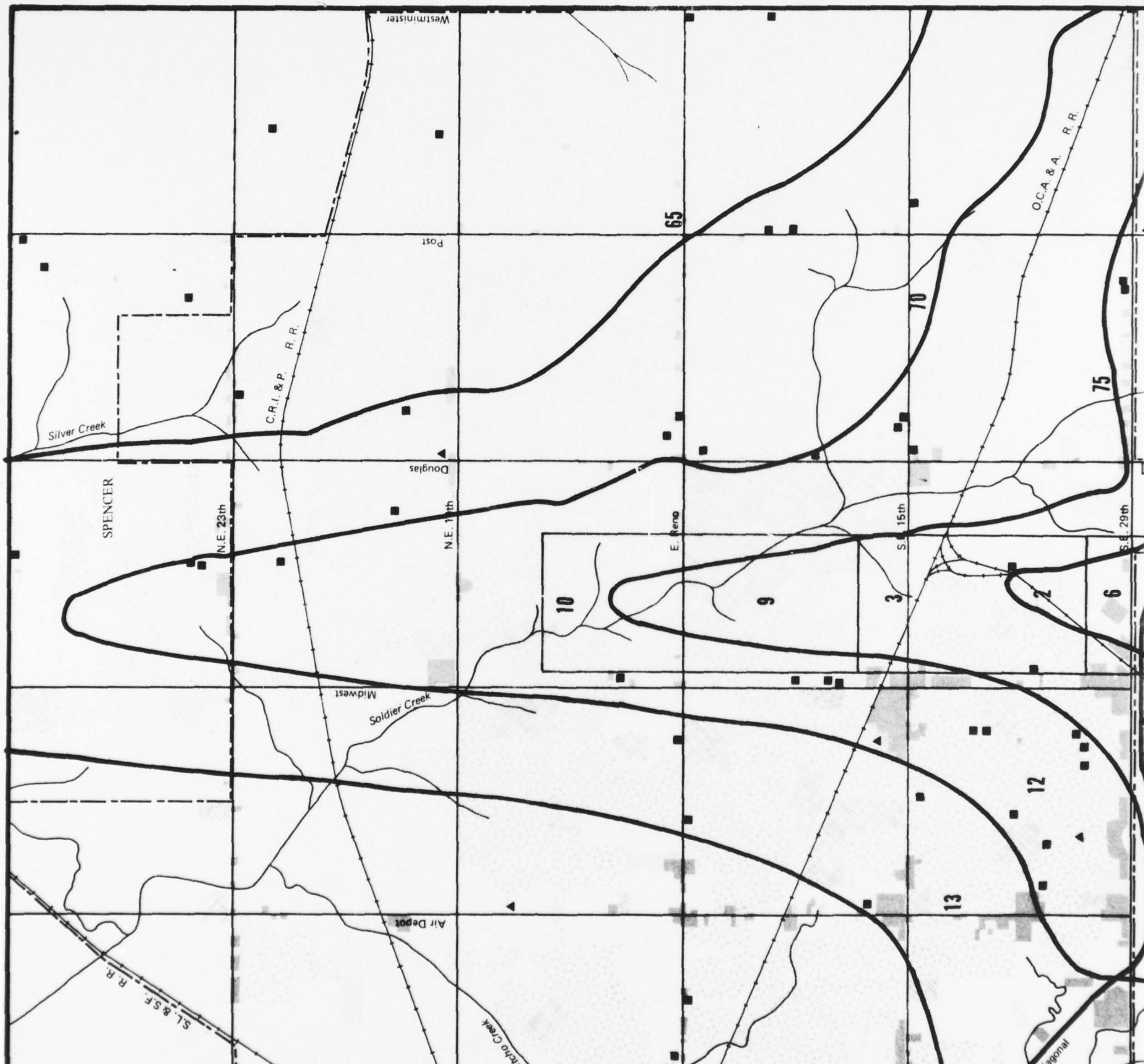
* This map was adapted from one developed by the Midwest City Planning Department based on a March-June 1968 inventory of land use within the 18,560 acres within their political jurisdiction.



Westminster
Post
Douglas
Midwest
Air Depot
Sooner
Silver Creek
SPENCER
N.E. 23th
E. Reno
S.E. 15th
S.E. 29th
C.R.I. & P. R.R.
O.C.A. & A. R.R.
S.L. & S.F. R.R.
Soldier Creek
Crutcho Creek
Levee
Levee
Tinker Diagonal
65
70
75
10
9
3
2
6
12
13

1

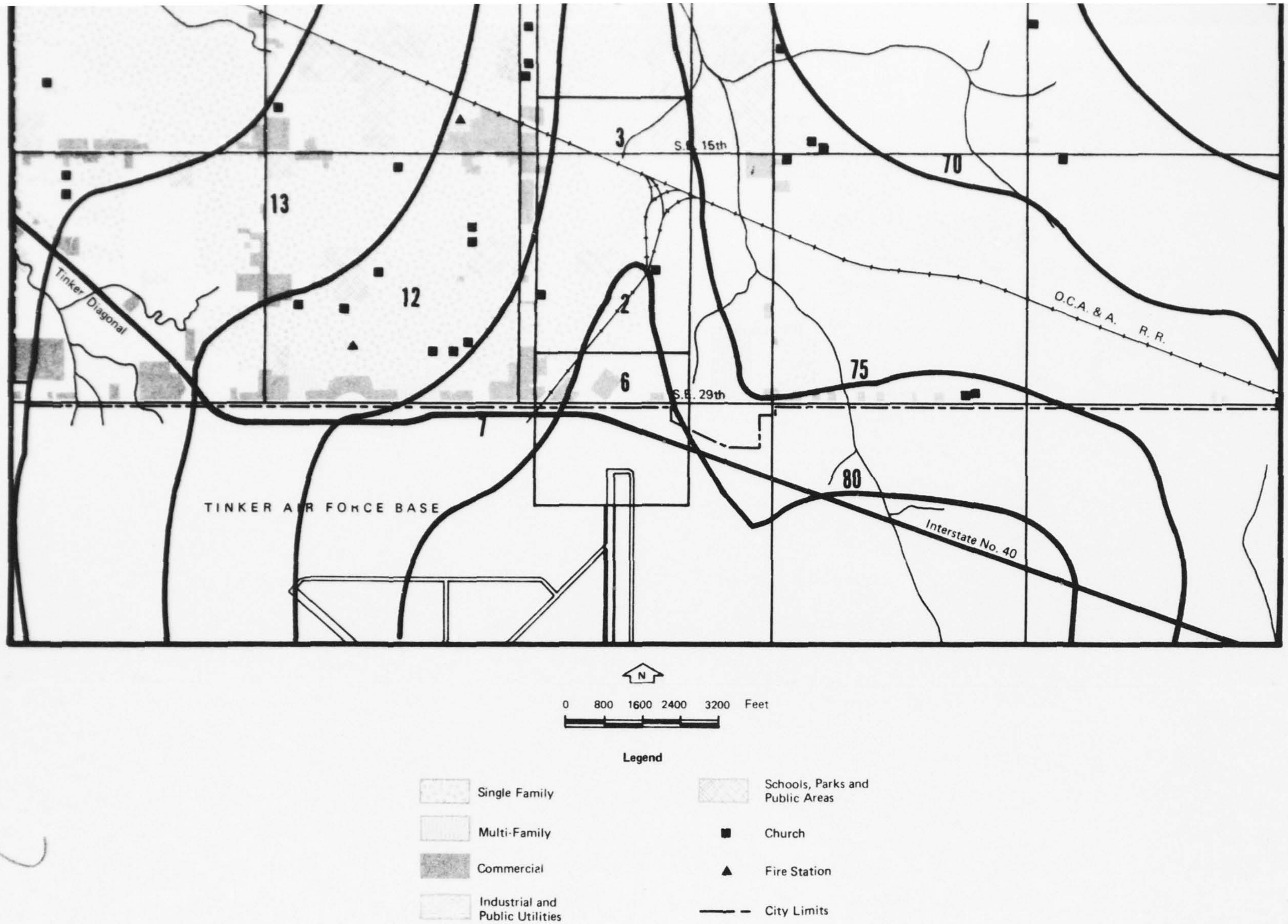


FIGURE 3.3.3–F GENERALIZED LAND USE – MIDWEST CITY, OKLAHOMA PRESENT MISSION

TABLE 3.3.3-C

LAND USE IN AICUZ AREAS - PRESENT MISSION, TINKER AFB
MIDWEST CITY, OKLAHOMA*

Land Use Classification	APPROXIMATE ACREAGE IN CUD ZONES							
	2	3	6	7	9	10	12	13
Residential Single and Multi-Family	0	5	0	75	73 --	70 --	725	1010
Commercial	0	0	4	35	0	1	81	130
Industrial and Public Utilities	0	10	5	3	5	0	10	20
Open Schools, Parks, Public Land	36	297	75	19	129	217	1570	2380
Total Acreage	36	312	84	132	207	288	2386	3540

* Acreage based on Generalized Land Use Map, The Planning Document, Midwest City Planning Department, 1970 (based on 1968 land use survey)

Total Acreage Exposed: 6985
Total Acreage Midwest City: 18,560
% Acreage Exposed: 38%

Incompatible land use and conditionally compatible land use exists under the present mission. Table 3.3.3-D gives the acres of incompatible land use and conditionally compatible land use found in Midwest City under the current mission at Tinker AFB. Much of the currently existing incompatible land use in CUD's 2 and 3, APZ I, will be eliminated by the removal of 836 homes, a school and eight commercial establishments (see Figure 3.5.2-B). This cleared area, referred to as the Glenwood Addition, is presently within the municipal limits of Midwest City and even though cleared, will remain under the jurisdiction of Midwest City. Removal of homes from the Glenwood Addition has been considered complete for purposes of this discussion and any homes not yet removed have not been included in Table 3.3.3-D. Under the present mission a total of approximately 157 acres of incompatible land use exists. This incompatible land use is predominantly residential development in CUD 7 and 9. In addition, approximately 1955 acres are considered conditionally acceptable uses only.

Land areas between L_{dn} 65 and 75, which include the CUD's 4,5,10,11,12 and 13 may not qualify for federal mortgage insurance in residential categories, according to the HUD Document #1390.2 entitled "Circular on Noise Abatement and Control." HUD approval in such areas is discretionary, and would generally require specific noise attenuation (insulation) measures. Past Air Force experience and the lack of definitive criteria do not justify an Air Force recommendation to categorically prohibit residential uses within these areas, although residential uses of this land may be quite undesirable. However, wherever possible, residential use should be located below L_{dn} 65.

Residences in CUD's defined by L_{dn} between 65 and 75 are, similarly, conditionally acceptable depending on the noise reduction achieved by the residential structure. For the present mission, approximately 41436 residents occupy 11358 housing units within such areas. No survey was conducted to determine how many and what type buildings now meet the required degree of noise reduction indicated in the AICUZ compatibility guidelines.

3.3.3.6 Sonic Boom Occurrences

No aircraft based at Tinker AFB fly at supersonic speeds during any of their scheduled operations. Supersonic flight, and hence possible sonic booms, are not ruled out altogether, however, since under Air Force regulations, supersonic velocities may be attained when, in the judgment of the pilot, an emergency occurs, or under certain military exercises. Under any such circumstances, supersonic flights must be reported under procedures established by the Air Force, as discussed in Appendix E. When damage to civilian property occurs as a result of sonic booms by an Air Force or Air National Guard aircraft, the Air Force must accept responsibility for restitution and payment of just claims.

TABLE 3.3.3-D

INCOMPATIBLE LAND USE UNDER AICUZ*
PRESENT MISSION
MIDWEST CITY, OKLAHOMA

Land Use Classification	APPROXIMATE ACREAGE IN CUD ZONES 2	3	6	7	9	10	12	13	Total
Residential Single and Multi-family	---	5	---	75	73	(70)	(725)	(1010)	153 (1805)
Commercial	---	---	4	(35)	---	(1)	(81)	---	4 (117)
Industrial and Public Utilities	---	(10)	(5)+	(3)	(5)	---	(10)	---	(33)
Open Schools, Parks, Public Land	---	---	---	---	---	---	---	---	-----
Total	---	5	4	75	73	---	---	---	157 (1955)

* As defined by AICUZ Land Use Compatibility Guidelines (Appendix D)

\+ ( ) conditional land use as defined by AICUZ

3.3.4 NOISE OTHER THAN THAT DUE TO AIRCRAFT OPERATIONS

When everyday normal operations of Tinker AFB as a whole are considered, no strictly on-base activities are significant contributors to unwanted outdoor noise in the surrounding communities. (In this regard, the jet engine test cells are included in the category of aircraft noise, Section 3.3.3.)

Off-base, however, Tinker does contribute to noise in the surrounding communities through its commuting workforce. The peak-hour traffic flows at principal intersections of access roads and Tinker gates for 1966 [27] indicate that for S.E. 29th Street much more than one-half of 1,000 to 2,000 vehicles per hour that use this road are Tinker commuters. On Douglas Boulevard more than 90% of the peak-hour traffic flow is due to Tinker. At Gate 34 on S.E. 59th Street, the flow is probably all Tinker traffic. Similar intersection data for the Tinker Expressway is not available, but from the traffic counts presented in Table 3.4.8-C and Figure 3.4.8-A it appears that at least half, and probably much more, of this traffic is generated by Tinker commuters. Although there are some changes in traffic from this 1966 period to 1974, these changes are relatively minor since the total base commuting traffic has changed only 1% in eight years (see section 3.4.8).

The diffusion of Tinker-originated traffic into the general community traffic, with increasing distance from Tinker, prohibits any treatment of traffic noise beyond the immediate access roads mentioned. It is worth noting, however, that the difference in noise level between midday traffic and commuting hour traffic is significantly larger than the increment in noise level caused by that traffic directly attributable to Tinker commuters.

3.3.5 SPECIES AND ECOSYSTEMS

The 4,200-acre site of Tinker AFB is situated on a relatively flat expanse of grassland, exhibiting no distinctive topographic features and lacking any good flowing streams. In 1941 the first property was acquired that is today part of Tinker AFB. At that time the area was characterized by large expanses of agricultural land. At the present time, almost the entire acreage is under intensive use for the airfield, golf course, housing area, offices, laboratories, and shops. Naturally occurring ecosystems are, therefore, limited on the base.

In general, the area surrounding Tinker AFB is also characterized by intensive development. To the north and west of the base, naturally occurring ecosystems have been eliminated by development, while to the south and east, development is less extensive and vast areas of grassland, often under agricultural use, and deciduous forest may be encountered.

Oklahoma County is situated within a grassland-forest ecotone, a transition zone between the temperate deciduous forest to the east and the temperate grasslands to the west, which stretch in a north-south boundary from Alberta, Canada to Texas [54, 55]. Bruner [55] has divided the State of Oklahoma into six vegetational regions, with the area of Tinker AFB being located within the Stipa-Koeleria association or true prairie. Under naturally occurring conditions the eastern limit of the true prairie is characterized by tall grasses, which grow from three to four feet during the summer months, such as blue-stem or beardgrass (Andropogan sp.), the switchgrass (Panicium virgatum) and rye-grasses (Elymus sp.). Agriculture, primarily over-grazing and cultivation, has largely removed these naturally occurring species and replaced them with shorter forms such as blue grama and buffalo grass.

On the eastern border of the Stipa-Koeleria association lies the oak-hickory savannah, an area characterized by varying degrees of dominance of woodland and prairie. Such an area is located just east of Tinker. The transition from forest to prairie is an edaphic one, though both climatic and man-made conditions also influence the existence of prairie or forest. The soils within the oak-hickory savannah are of sandstone while those of the true prairie are heavier soils of clay and shale. Islands of woodlands occur in the true and mixed prairie on sandstone outcrops and tongues. The prairie-forest interface is aligned along this edaphic boundary with shifts eastward during periods of drought and westward during years of increased precipitation [54, 55].

Belts of deciduous trees are found extensively along streams, as is the case along Crutcho Creek to the west of the air base and Soldier Creek to the east of the air base. American elm (Ulmus americanus) and willows (Salix sp.) were the dominant species found along these streams. Other vegetative species common to flood plains include cottonwood, box elder, sumac, and oak. Many species of deciduous trees reach their western limit in this region [55].

Natural habitats are severely limited within the area of Tinker, therefore, both the numbers and variety of faunal species present are probably limited. For the region as a whole, the variety of species is probably great, as is characteristic of an ecotone; species common to both the prairie and deciduous forest ecosystems would be present. Mammalian species commonly seen in the region include the eastern fox squirrel, thirteen-lined ground squirrel, plains pocket gopher, eastern cottontail, white-footed mouse, gray fox, coyote, bobcat, striped skunk, raccoon, opossum, mink and redbat [57]. A detailed listing of reptiles common to the area may be found in the work of Webb [56]. As with mammals, the geographic distributions of other fauna coincides with the established physiographic regions, with the

eastward and westward extent of habitat varying by species.

Over 200 species of birds, representing 48 families, have been observed within the area of Oklahoma, Canadian and Cleveland Counties.* Three species of avifauna represent an air strike hazard, these are the starling, the swift, and the Franklin's Gull. The swift and Franklin's Gull represent a seasonal air strike hazard problem. The swift is a small bird and, therefore, should not be of major concern. The Franklin's Gull, a prairie bird, is occasionally a problem during migration season as it moves between the large prairie water impoundments of the southern prairies of the United States and those of Canada. Bird strike hazards are discussed in Section 3.1.4.

Eleven wildlife species, officially listed by the federal government as "endangered" are known to exist in Oklahoma [58]. None of these species is common to the area of Oklahoma County and Tinker AFB.**

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* Personal Communication, George M. Sutton, Stoval Museum, University of Oklahoma, Norman, Oklahoma, November 21, 1974.

** Personal Communication, Dick Cook, Department of Wildlife Conservation, State of Oklahoma, Oklahoma City, Oklahoma, November 20, 1974.

3.4 SERVICES AND FACILITIES AT TINKER

3.4.1 WATER SUPPLY

The water distribution system at Tinker AFB segregates potable and non-potable water (for fire fighting). Both systems are supplied by 27 government-owned water wells and an Oklahoma City Water Department (OCWD) supply line (see Figure 3.4.1-A). Nine storage tanks have a combined capacity of 3,552,000 gallons, 1,802,000 gallons of which are for non-potable uses. The potable water system is disinfected by chlorination, fluoridated, and monitored for chemical quality and bacterial contamination.

In fiscal year 1974 (July 1, 1973 to June 30, 1974), the average daily consumption, based on well log data, was 4.89 million gallons. Consumption in the family housing areas averaged 160 gallons per capita per day (gpcd) or about 7.5 percent of the total base consumption.

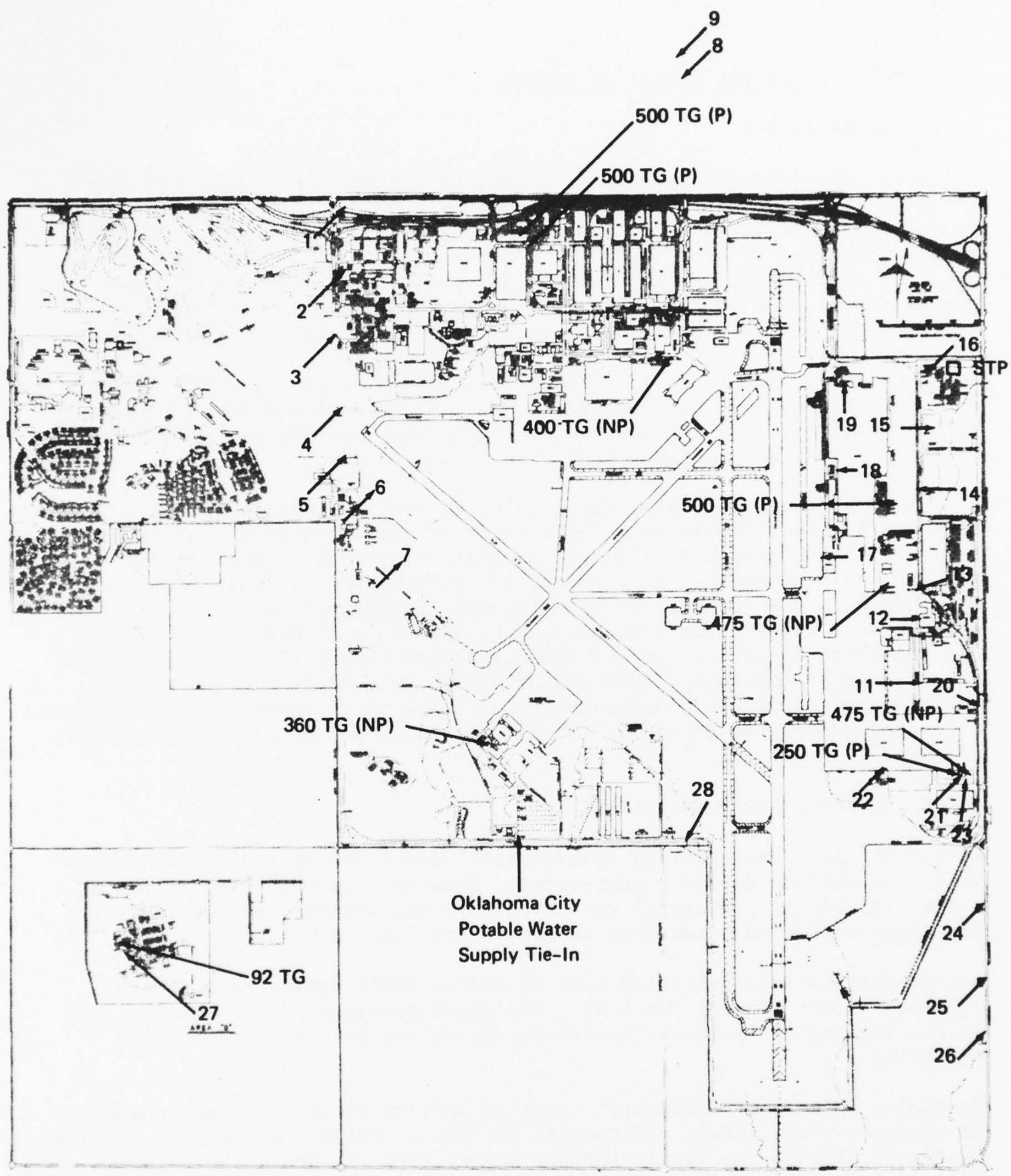
Information concerning rated capacity of the wells is not available; however, a recent preliminary (MGD) study of utilities at Tinker AFB suggests that a figure of 7.0 million gallons per day be adopted for combined well capacity. At present, the OCWD source is limited to 2.2 MGD, which is the capacity of the presently installed pump. On the basis of the above figures for reliable supply and the 4.89 MGD of average demand, there appears to be a 4.3 MGD residual supply (7.0 + 2.2 - 4.89). However, under abnormal conditions or dry weather (July and August) and maximum day and peak hour consumption, the system is infrequently overtaxed. Study is underway to determine remedial solution and prepare for long-term demands.

3.4.2 SEWERAGE TREATMENT FACILITIES

Tinker AFB is a generator of considerable quantities of industrial waste-water, as well as domestic wastewater. Sewerage treatment facilities at Tinker include an industrial waste facility and sanitary sewage facility. Treatment of residual sanitary sewage is provided by Oklahoma City.

All sanitary sewage generated east of Runway 35/17 drains to a sewage treatment plant (Figure 3.4.1-A). The plant consists of a Parshall flume inlet, rectangular primary clarifiers, trickling filters, and a final clarifier.

Treatment is at the "secondary" level as defined by the U.S. Environmental Protection Agency (EPA), and the Air Force has obtained a National Pollution Discharge Elimination System (NPDES) Permit from the EPA. There is no state, city, or county authority over the Air Force with regard to permitting of discharges. However, the levels of treatment required of the Air Force by EPA are the same as those for municipal and private discharges.



TG – Thousand Gallons
NP – Non-Potable for Firefighting
P – Potable
STP – Sewage Treatment Plant.

FIGURE 3.4.1–A WATER SUPPLY WELLS AND WATER STORAGE TINKER AFB, OKLAHOMA

Sanitary sewage not treated at the Tinker facility is transported via interceptor sewers to the Oklahoma City South Side Sewage Treatment Plant. Sanitary sewage generated in the military family housing area is treated at the South Side facility. This facility, for which a NPDES permit was issued on 1 November 1974 has a design capacity of 25 MGD. Present average daily flow is 13 MGD.*

Industrial chemical wastes generated almost entirely at the Oklahoma City ALC at Tinker are treated at an industrial waste treatment facility. The facility is designed for a hydraulic load of 1.5 MGD. A preliminary report of an ongoing study of Utilities Modernization Program states that flow rates have been as low as 300,000 GPD with occasional peak rates of 1 MGD. The plant operates on a "fill and draw" system whereby an equalization tank is emptied through the plant at a steady-state rate while another tank is being filled from the collection system.

The single largest contributor to the facility is the ALC Plating Shop. During a four-day period (15 Nov to 18 Nov 1974) the average daily consumption rate was approximately 400,000 gallons, 80 percent or 320,000 gallons of which enters the Industrial Waste Treatment Facility. The facility has highly sophisticated process designed for the removal of such constituents as cadmium, chromium, cyanide, copper, lead, nickel, zinc, phenols, oil, and grease.

With the goal of providing continuous reliable treatment, the Air Force is studying the facility with the help of outside consultants, to determine design improvements.

3.4.3 ENERGY UTILIZATION

Tinker AFB, like any modern industrial complex or airport, consumes fossil fuels directly or indirectly in the course of its business. Tinker AFB consumes natural gas and fuel oils to provide office heating and cooling, hot water, and industrial steam. It purchases electricity from the local power company to run its lights and machinery. Petroleum fuels are purchased, stored, and ultimately consumed by aircraft, motor vehicles, maintenance equipment, and emergency generating units.

Table 3.4.3-A presents the current energy consumption of the air base.

3.4.4 SOLID WASTE DISPOSAL

Solid waste generated at Tinker is transported to an Air Force leased and operated sanitary landfill on 59th Street, Oklahoma City. During a period July through October 1974, an average monthly volume of 51,927 cubic yards

*Personal Communications, Operation Supervisor, Oklahoma City Pollution Control Administration.

Table 3.4.3-A

Energy Utilization, 1974

Energy Source	Use	Quantity*	Energy Consumed BTU	Percent of Total
JP4	Jet Fuel	37,453,025 gal/yr	4.617×10^{12}	56 %
Aviation Gasoline	Piston Aircraft	1,678,682 gal/yr	1.952×10^{11}	2.4 %
87 Octane Gasoline	Ground Vehicles**	1,097,967 gal/yr	1.402×10^{11}	1.7 %
Diesel Fuel	Ground Equipment	220,511 gal/yr	2.979×10^{10}	.4 %
Fuel Oil #2	Emergency Heating	564,588 gal/yr	8.126×10^{10}	.8 %
Natural Gas	Heating, Steam	$2,477 \times 10^{6}$ ft^{3}/yr	2.601×10^{12}	31 %
Electricity	Lighting, Machinery	187.35×10^{6} KWH	6.392×10^{11}	7.7 %

*Personal Communication, POL Section, Nov 8, 1974, and Civil Engineering, Nov 7 and Nov 21, 1974.

**Does not include fuel sold by the base exchange for use in private vehicles.

was collected at Tinker.

Hazardous materials and contaminated fuels and oils are carried by contract tank truck to state-approved hazardous waste land fills at Criner, Oklahoma.

3.4.5 FIRE PROTECTION AND RESCUE

Fire Protection and Rescue is provided by the Tinker Fire Department consisting of 82 civilian personnel. Fire fighting equipment includes:

4 - P2 Crash Trucks
1 - P4 Crash Truck
1 - 06 Crash Truck
2 - P12 750 Pumpers
1 - 750A Pumper
2 - P6 Ramp Patrol Trucks
1 - F6 Runway Foamer
1 - 1500 Gallon Water Truck
1 - P10 Rescue Truck
1 - 400 Gallon Light Water Supply Trailer

In calendar year 1974 the Tinker Fire Department responded through a mutual aid agreement 10 times in support of fire fighting in Del City, Midwest City, and Oklahoma City.

Aircraft rescue is also provided by the Fire Department. Fifteen civilians are trained and qualified aircraft rescue personnel. Training for egress rescue of the AWACS aircraft will begin with the beddown of the first E-3A. As the fuselage of the E-3A is the Boeing 707, no unusual problems are expected in training aircraft rescue personnel for the AWACS.

3.4.6 LAW ENFORCEMENT

Tinker AFB security is maintained by a police force of 36 military and 79 civilian personnel. The Tinker Security Department maintains liaison with the law enforcement agencies of Del City, Midwest City, Oklahoma City and Oklahoma County.

Tinker AFB is not wholly owned by the federal government. That area of the base on which is situated military family housing, clubs, recreational facilities, and hospital is land leased by the Air Force and is as such under "proprietary jurisdiction" insofar as law enforcement is concerned. Crimes committed in these areas which are not against the federal government are tried by civil court (county attorney). All crimes committed on federal property or against the federal government are prosecuted by the U.S. District

Attorney in the Federal District Court, Oklahoma City.

From 1 April 1973 to 31 March 1974, 212 crimes were committed by military and civilian personnel employed at Tinker AFB. Although termed "major offenses" by the Air Force, the category lumps certain misdemeanors and crimes of less seriousness than those connoted by the classification.

Riot control is a responsibility of the Tinker Security Department. In addition to the police force, 60 non-police personnel are fully trained and equipped for riot control. No reciprocal agreements with local law enforcement agencies are in effect as civil disturbances on non-federal land come under the auspices of local government or the National Guard at the discretion of the Governor.

3.4.7 WEATHER SERVICE

There are two weather units based at Tinker AFB. "Base Weather," Detachment 1, 15th Weather Unit, provides meteorological service for Tinker-based aircraft, as well as for transient military flights in the Tinker area. This unit is charged with providing weather observations and forecasts for the local area, wide-area forecasts, route and terminal forecasts for pilot use, analysis and display of weather charts, weather advisories and warnings, as well as any additional weather support for the activities of Tinker-based organizations.

The 6th Weather Unit (Mobile) is also based at Tinker. As the only mobile weather support unit in the free world, it provides, at any time, weather support to projects on a worldwide basis. This unit is responsible for the deployment of mobile weather units for the observation and sensing of surface and atmospheric, for the United States Air Force, the Department of Defense. It also provides intermediate maintenance for meteorological equipment operated by Air Weather Service Units in the Continental U.S..

3.4.8 TRANSPORTATION AND TRAFFIC

Seven principal roads provide access to Tinker AFB from surrounding communities: Tinker Expressway (Interstate 40), S.E. 29th Street, Douglas Boulevard, Midwest Boulevard, Air Depot Boulevard, S.E. 59th Street, and Sooner Road. Additional access has been provided by the Southeast Expressway (Interstate 240) which was opened recently, but has not yet been shown to change significantly the trip patterns to Tinker. These access routes are shown in Figure 3.4.8-A.

Tinker Expressway (I 40), which follows an easterly course from Oklahoma City, along the north side of the base, provides direct access to the base via its interchanges with Air Depot Boulevard, F Avenue, and Industrial Road at Gates 1, 2, and 7. Indirect access is provided to Gates 20, 21, and 29 by the interchange at Tinker Expressway and Douglas Boulevard. S.E. 29th Street follows an east/west alignment along the north side of the base and provides access from Oklahoma City, Del City, and Midwest City to the base through its intersections with Air Depot Boulevard, F Avenue, A Avenue, and Industrial Road. Douglas Boulevard is a north/south road paralleling the eastern side of the base. This roadway provides direct access to Gates, 20, 21, and 29. Midwest Boulevard provides access from Midwest City in the north to Tinker AFB gates via S.E. 29th Street. Midwest Boulevard intersects S.E. 29th Street some 300 feet northwest of Gate 3. Air Depot Boulevard provides direct access via an underpass beneath the Tinker Expressway to Gate 1,

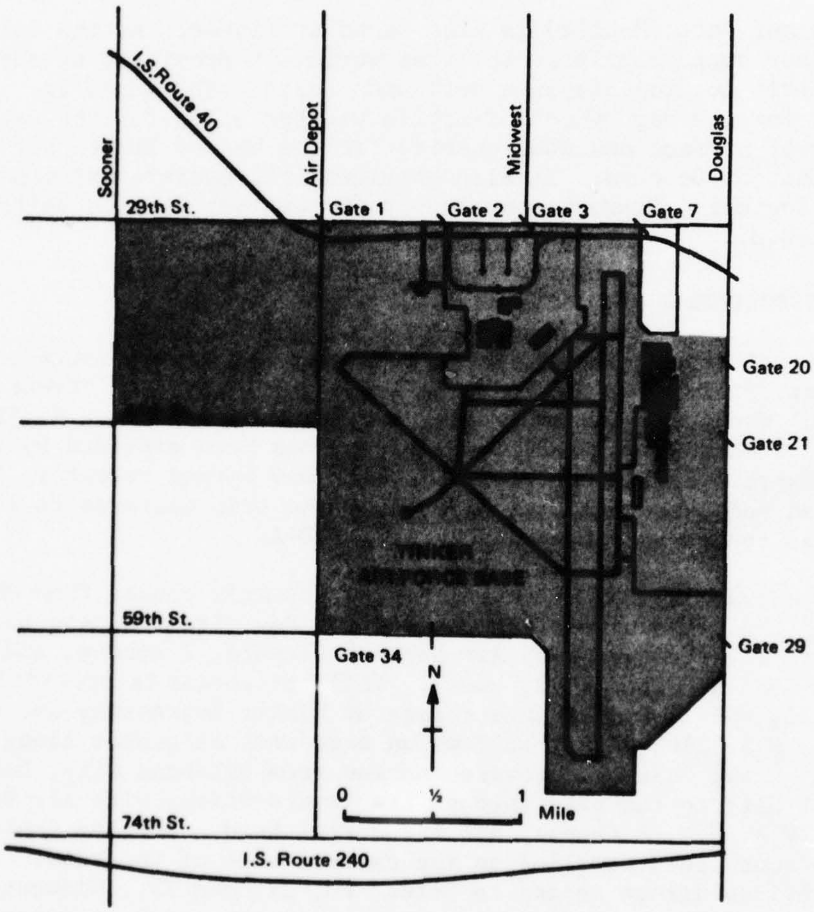


FIGURE 3.4.8–A MAJOR ACCESS ROADS, TINKER AFB

from Midwest City to the north. This roadway serves traffic approaching from the east and west on the Expressway and on S.E. 29th Street via an interchange and intersection, respectively, located at the northern perimeter of the base. S.E. 59th Street provides direct access from the east to Gate 29 and from the west to Gate 34. Because of the southerly extension of the base runways in this area, there is a break in S.E. 59th Street between its intersection with Douglas Boulevard at Gate 29 and its intersection with the southern section (unimproved) of Midwest Boulevard. Sooner Road follows a north/south alignment along the western side of the base. This road is traveled primarily by those motorists who enter the base at Gate 34 via S.E. 59th Street. Southeast Expressway (Interstate 240), 1/2 mile south of the base, follows an easterly course 4 miles west of the base from Interstate 35, and intersects with Interstate 40, 4-1/2 miles east of the base. It provides access to Tinker AFB via Sooner Road and Douglas Boulevard [27].

Table 3.4.8-A lists the periods of operation of the eight gates at Tinker AFB, and Table 3.4.8-B gives the traffic volume for those gates for the years 1966 and 1974 [27]*. Even though the base population has decreased by 17% in eight years, the total of 24-hour vehicle trips through the gates has decreased by only 1%, a decrease indicating a greater vehicle use per person. The peak morning incoming vehicle count has shifted from Gate 2 to Gate 1, primarily due to the restricted operating hours of Gate 2. Generally, the peak traffic flows have increased at most gates (apparently due to restricted gate operation), but the total daily flow has remained essentially unchanged. In 1966 occupants numbered 1.5 per vehicle, and the 1974 vehicle counts indicate that this figure has probably decreased.

Because of the relative consistency of the traffic counts in 1974 compared with those from 1966, it is expected that the effect of Tinker AFB traffic on the surrounding communities has not changed appreciably in eight years. Traffic data (1966) for access roads to Tinker AFB are depicted in Figure 3.4.8-B. In this figure the off-base traffic flow to the various gates is presented and represents the off-base traffic load attributable to all incoming Tinker morning traffic. The data of the figure does not correspond exactly to the first two columns of Table 3.4.8-B, but is roughly proportional to this three-hour gate count. It can be assumed, with little error, that the afternoon existing traffic would be a simple reversal of directions with a slightly greater timewise peaking.

The relationship of this Tinker traffic data of Figure 3.4.8-B to the total traffic on some of the surrounding community roads is shown in Table 3.4.8-C. The traffic attributable to the commuting population of Tinker is a major portion of the total traffic. Although peak commuting hour traffic counts are not presented for these access roads, Tinker AFB could be expected to account for a large percentage of this traffic. The Tinker Expressway appears to provide substantial relief to other local roads, in particular

* Personal Communication, Major Philip Stowell and Mr. Leroy Tarr, Base Security, Tinker AFB.

Table 3.4.8-A

Periods of Operation of Entrance/Exits Gates

GATE	HOURS OF OPERATION* Weekday (hrs) 1966	1974	Weekend 1966	1974
1	24 hrs.	24 hrs.	24 hrs.	24 hrs.
2	24 hrs.	0530-1800	24 hrs.	Closed
3	0530-0130	0530-0030	Closed	Closed
7	0600-1730	0530-0830 1430-1730 2345-0030	Closed	Closed
20	24 hrs.	24 hrs.	24 hrs.	24 hrs.
21	0630-1730	0600-0830 1500-1730	Closed	Closed
29	0530-1800 2230-0130	0530-1730 2200-0030	Closed	Closed
34	0600-1730	0600-0830 1500-1730	Closed	Closed

*All gates may be opened on demand for special occurences, such as mass overtime.

Table 3.4.8-B

TRAFFIC VOLUME BY GATE 1966[1] AND 1974[2]

GATE	PEAK 3-HOUR AM INCOMING VEHICLES		TOTAL 24-HOUR TWO-WAY VEHICLES		PERCENT OF TOTAL TWO-WAY TRAFFIC	
	1966(Sept)	1974(April)	1966(Sept)	1974(July-Aug)	1966(Sept)	1974(July-Aug)
1	2,090	2,675	11,900	15,177	23.3	30.0
2	2,890	2,775	12,900	9,436	25.3	18.7
3	1,390	675	3,700	3,265	7.3	6.5
7	2,275	2,475	6,500	5,876	12.7	11.6
20	1,970	2,125	6,800	8,404	13.2	16.6
21	1,325	1,135	4,300	2,631	8.4	5.2
29	1,300	1,835	3,900	4,902	7.6	9.7
34	445	415	1,125	869	2.2	1.7
TOTALS	13,685	14,110	51,125	50,560	100.0	100.0

NOTE:

	1966	1974
Parking Spaces Available	15,743	19,277
Total Base Population	27,581	23,185

1 Reference 27.

2 Personal communication from Major Philip Stowell and Mr. Leroy Tarr, Base Security.

Table 3.4.8-C

Comparison of Total Local Traffic with Traffic Associated With Tinker AFB

ROAD SEGMENT	TOTAL AVERAGE DAILY, ONE-WAY see note	TINKER MORNING[2] INCOMING (DIRECTION)
Tinker Expressway[1]:		
1/2 Mile West of Gate 1	21,500	5,110 (E)
Between Gates 1 and 2	18,900	4,400 (E)
Between Gates 3 and 7	14,800	3,000 (E)
East of Douglas Blvd.	11,200	1,570 (W)
Douglas Boulevard[3]:		
North of Gate 20	6,000 (1973) Est. 6,600 (1974) Est.	4,500 (S)
South of Gate 29	2,560 (1973) Est. 5,000 (1974) Est.	1,500 (N)
Southeast Expressway[3]:		
West of Douglas Blvd.	8,000 (1974) Est.	Unknown
East of Douglas Blvd.	3,300 (1974) Est.	Unknown
S.E. 29th Street[3]:		
West of Gate 1	11,300 Est.	3,436 (E)
Between Gates 1 and 2	9,600 Est.	2,600 (E&W)
East of Gate 2	9,700 Est.	3,000 (E&W)

NOTE: One-way traffic estimated to be one-half of bothway traffic.

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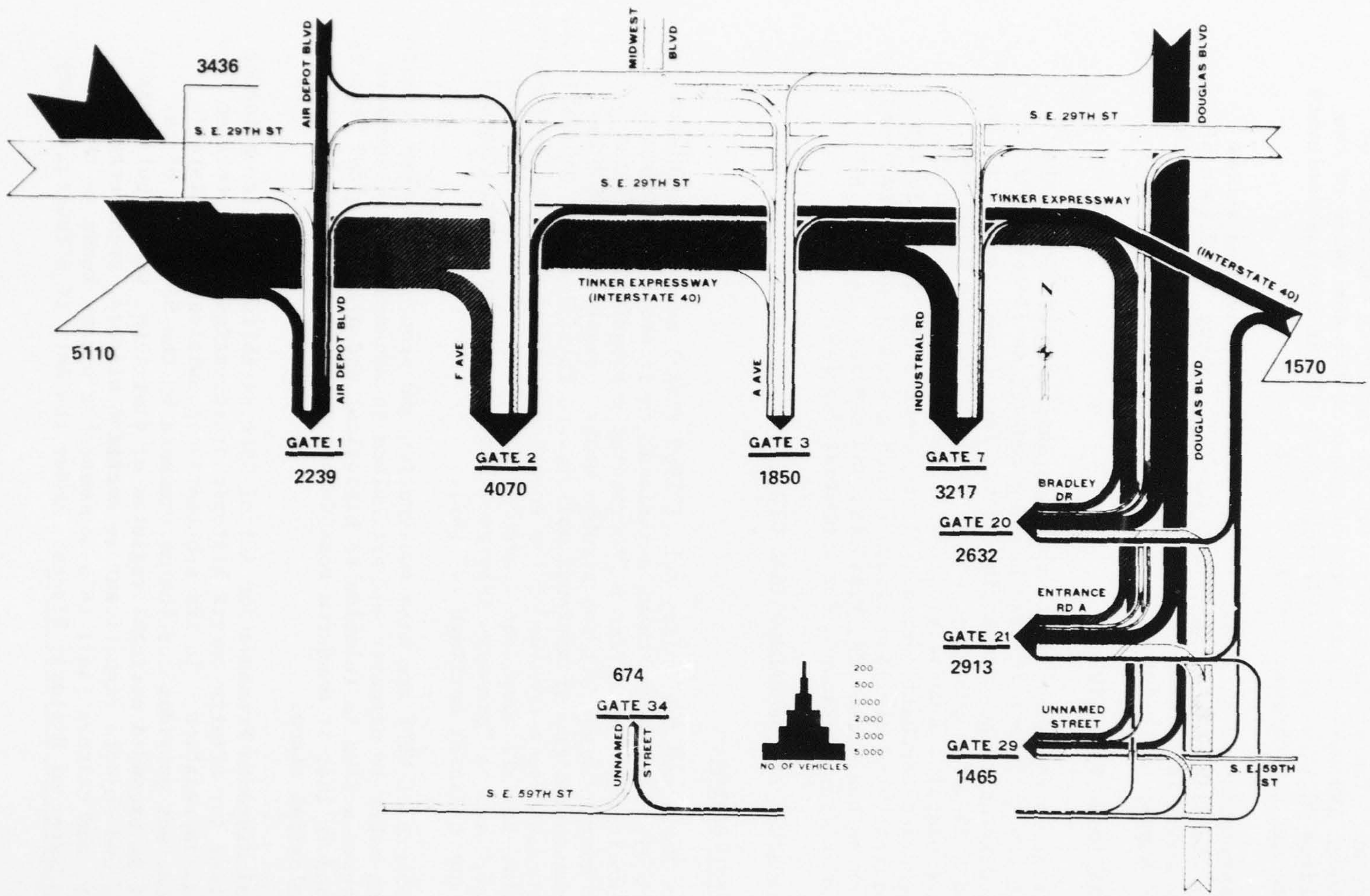
[1]Personal communication, Mr. Samuel Shehab, State Highway Planning Department; data for 1973.

[2] Reference 27, Figure 3.4.8-B herein, data for 1966.

[3]Personal communication, Mr. John Bates, City Engineer, Midwest City, and Midwest City Traffic Count Atlas, revised January 1974.



Source: U.S. Army Transportation Engineering Agency. *Traffic Engineering Study, Tinker Air Force Base, Oklahoma.* No. 67-10 Newport News, Virginia, by the Army, 1967. (Numbers added to figure from same source)

FIGURE 3.4.8-B VEHICLE TRIPS DURING MORNING INCOMING TRAFFIC, APPROACH ROADS TO GATE, TINKER AFB

S.E. 29th Street. The predominantly civilian commuting population of 18,000 at Tinker AFB works in an area centered on the east side of the base at Building 3001 is responsible for almost all of Douglas Boulevard daily traffic and the through traffic of Gate 7.

Public transportation is an insignificant factor in providing access to Tinker [27]. Rail and truck transportation bring about 8,000 tons of material per month into the base, and this figure is indicative of the scale of the supply and maintenance operations at the installation.

3.4.9 RECREATIONAL FACILITIES

A wide range of recreational facilities are available at Tinker AFB. These facilities include a 16-lane bowling center, an 18-hole golf course with driving range and putting green, four tennis courts, riding stables, and a 25-meter swimming pool located in the base gymnasium. The gymnasium contains a variety of facilities including sauna bath, exercise rooms and handball courts. Picnic grounds are available for both base military and civilian personnel and a variety of recreational supplies such as boats, motors, trailers, and camping equipment are available to military personnel for a nominal fee [4].

3.4.10 HISTORICAL AND ARCHAEOLOGICAL SITES

3.4.10.1 Regulations

The National Environmental Policy Act of 1969 (NEPA) establishes historical and archaeological preservation as a national environmental objective. The policy declaration specifies a "continuing responsibility of the Federal Government to use all practicable means, consistent with other essential considerations of national policy...to fulfill the responsibilities of each generation as a trustee of the environment for succeeding generations," and to "assure for all Americans...aesthetically and culturally pleasing surroundings," and to "preserve important historic, cultural, and natural aspects of our national heritage..." [47].

The requirements of NEPA are both substantive and procedural. They require the decision-maker to discover and articulate in advance the consequences of the proposed action in relation to historical and archaeological impacts. NEPA is broad in that it mandates consideration of all important historic and archaeological sites.

The National Historic Preservation Act of 1966 established policy guidance and mechanisms for efforts toward historic preservation and protection from governmental depredation. In its substantive provisions, the Historic Preservation Act provides for the maintenance by the Secretary of the Interior of an expanded national register of districts, sites, buildings, structures, and objects significant in American history, architecture, archaeology, and culture [48]; this document has become known as the National Register of Historic Places. Under the Act, if a federal agency

has direct or indirect jurisdiction over a proposed federal, federally-assisted, or federally licensed undertaking that would affect any property listed on the National Register, the head of that agency has two responsibilities under Section 106 before approving the project. The agency must "take into account the effect of the undertaking" on the National Register Property and "shall afford the Advisory Council on Historic Preservation...a reasonable opportunity to comment with regard to such undertaking" [48].

Executive Order No. 11593 issued in the furtherance of the purposes and policies of NEPA and the National Historic Preservation Act of 1966 requires all federal agencies to locate and nominate to the Secretary of the Interior, all sites which appear to qualify for listing on the National Register of Historic Places (Section 2(a)). It further requires that the Head of the agency refer any questionable sites to the Secretary of the Interior for his opinion respecting their eligibility for listing (Section 2(b)). After the nomination of listings, if the agency proposes to alter substantially the property in question, it should not act with respect to the property until the Advisory Council on Historical Preservation (Department of the Interior) has an opportunity to comment.

Compliance with NEPA, however, does not constitute compliance with Executive Order 11593 and the National Historic Preservation Act [49]. The procedure and substance of these laws must be complied with independently.

3.4.10.2 Historical Sites at Tinker AFB

The area of Tinker AFB contains little of either historical or archaeological significance. From artifacts and archaeological discoveries, it is known that Indians of pre-historic America often traveled through this area. Recorded history saw the region first claimed by Francisco de Coronado in 1541 for Spain and later claimed by England in 1663. Neither country made a serious effort to explore the region. The area was finally annexed to the United States under the Louisiana Purchase in 1803. Under the 1830 Indian Removal Bill, which called for the relocation of Indian tribes of the American South to the midwest, the Central Oklahoma area was assigned to the Creek and Seminole Indians. Following the Civil War, a portion of this area was taken away to resettle Plains tribes. In the reassignment, the area of the present Oklahoma City SMSA, was assigned to no one; thus this area became known as the "Unassigned Lands." Until the land rush of April 21, 1889, which opened the areas to settlers, no permanent settlements existed [32]. As is the case in the State of Oklahoma, little remains of the area's early history to be preserved [19].

The 4,200-acre site of Tinker AFB was undeveloped land until 1941 when it was selected by the Air Force as the location of an air depot. No National Register properties, listed or nominated, or properties considered of historical significance by the Oklahoma Historical Society are located at Tinker AFB or within the AICUZ Compatible Use Districts. Further consultation with the Oklahoma State Liaison Officer designated under the National

Historic Preservation revealed no properties of historical significance within this area.*

One site of historic interest exists at Tinker AFB. A two-acre cemetery, dating back to 1894, is located inside Gate One at the edge of the golf course (see Figure 3.4.10-A). The land had originally been State School Land but because it was not needed for this purpose the Land Commission sold it to people of German origin residing in the area for a cemetery. The cemetery was officially created January 10, 1916, when the Commissioners of the Land Office of the State of Oklahoma granted a Land Patent to the German Cemetery. The cemetery was part of 640 acres of land acquired for Tinker AFB by the Oklahoma City Chamber of Commerce in 1955 for expansion of personnel facilities at the base. Since the owners of the cemetery did not want to sell the land and relocate the cemetery, the Air Force granted them permanent access to the cemetery. The cemetary is owned by the German Cemetery Association and is referred to as the German or Kuhlman Cemetery (44).

Despite the lack of sites of historical significance in the immediate area of Tinker AFB, many are to be found within the five-county Oklahoma City SMSA as shown in Table 3.4.10-A. The closest property is Harne House, a National Register property, located about 16 miles northwest of Tinker.

3.4.10.3 Archaeological Sites at Tinker Air Force Base

There are no known archaeologic sites within the confines of Tinker AFB. The region is known through a 1972 surface survey of the areas of Crutcho Creek, passing to the west of Tinker field, and Soldier Creek, passing to the east of Tinker Field, as part of an impact study of proposed channel modifications to the two creeks. Eight sites of an acre or less in area were found and were probably camp sites and workshop areas. The cultural periods indicated by the debris range from late archaic to late prehistoric, a time span from about 1,000 BC to about AD 1700.**

3.4.11 HOUSING

Tinker Air Force Base presently has a total of 532 family housing units on base consisting of 268 Capehart Units, two Appropriated Fund Units constructed prior to 1950, and 262 Appropriated Fund Units constructed after 1950. Of these units, 110 are designated for officers and 422 for enlisted men. The six Appropriated Fund Houses meet only the minimum standards of adequacy and are scheduled for condemnation. On-base housing is currently provided for 532 families, accounting for 2,292 persons. During the period of FY 76 through FY 79, a maximum of

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* Personal Communication, Donald S. Coffin, State Liaison Officer under the National Historic Preservation Act, State Capitol Building, Civil Defense agency, Oklahoma City, Oklahoma, November 21, 1974.

** Personal Communication, Larry Neal, Acting State Archaeologist, Oklahoma Archaeological Survey, University of Oklahoma, Norman, Oklahoma, November 26, 1974.

FIGURE 3.4.10–A LOCATION OF THE GERMAN OR KUHLMAN CEMETERY, HISTORIC SITE, TINKER AIR FORCE BASE

Table 3.4.10-A

Properties in the Oklahoma City SMSA
Listed in the National Register of Historic Places or
Considered of Historical Significance by the Oklahoma Historical Society

County	Property	Location
Canadian	Fort Reno*	3 miles west and 2 miles north of El Reno
	Darlington Agency*	on north bank of N. Canadian River, 6 miles northeast of El Reno
	George Washington (Caddo Chief) Homeplace	south side of the Canadian River, 5 miles west of Union City
Cleveland	Chouteau's Post Indian Parley	adjoining U.S.77 north of Lexington
	Camp Mason	public park adjoining U.S.77 north of Lexington
	Washington Irving Encampment	within public recreational facilities at Lake Thunderbird, east of Normon
McClain	Wm. E. Chisholm House	4 miles south of Asher
	Camp Arbuckle (2nd site)	near OK,59 (SW/4, Sec.14, T5N, R2E)
Oklahoma	Overholser Mansion*	405 N.W. 15th Street, 1903 W.S. Matthews, Oklahoma City
	"Ringing the Wildhorse" Site*	W 1/2 sec. 17 and E 1/2 sec. 18, T, 13N, R.1W. (4 miles N.W. of Jones)
	Old North Tower, Central State College*	Edmond, 400 E. Hurd St.
	Harne House*	near Styles and N.E. 17th St., Oklahoma City
	Council Grove	area of historical marker at N.W. 10th Street Bridge, Council Road, Oklahoma City
	Payne (Oklahoma Boomer) Camp Site	park adjoining Moon Jr. High School, Oklahoma City - school site is in the future site of the Oklahoma Medical Center
	Oklahoma City Post Office, Courthouse and Federal Office Building*	Robinson and 3rd, Oklahoma City

Table 3.4.10-A (continued)

County	Property	Location
Pottawatomie	Shawnee Friends Mission*	Shawnee, on OK 18 east of 177
	Keokuk Falls	north side of N. Canadian River about 2 miles east of SH-99 bridge
	Chisholm Trading Post - Chisholm Spring, Camp Mason (1st site)	Chisholm Spring, 2 miles east of Asher
	Sacred Heart Mission	7 miles east of Asher
	Seminole Agency (1st site)	site adjoins OK 39, 8 miles east of the Seminole Council House

* National Register Property

Source: Oklahoma Historical Society, Annual Preservation Program (PL89-665) 1973.
Kent Ruth, Window on the Past: Historical Sites in Oklahoma, The Oklahoma Publishing Company, 1974.

200 units of family housing have been proposed for construction in order to provide housing for military personnel associated with the AWACS mission. Of these 200 units, 60 are four-bedroom units for officers with the remaining 140 four-bedroom units designated for airmen.

For unmarried airmen, housing is provided in six dorms with a total capacity of 960. Currently, about 700 single airmen live in dorms. Under the Military Construction Program (MCP), a dorm with a capacity for 100 airmen has been approved and funded. Construction of this facility will begin in May of 1977, and it will be available for occupancy in June of 1978.

There are also three officer quarter facilities on-base, which are used primarily by transients and have capacity for 139 officers. One suite is available for BOQ but almost all single officers elect to live off-base.

In summary, housing, excluding transient quarters, is currently available to 1,394 personnel at Tinker Air Force Base. Upon completion of the MCP dorm in 1978 this figure will be increased to 1,494. Additionally, if all proposed AWACS-associated housing were to be approved, this figure would be further increased to 2,088. In 1981, on-base housing will be available to about 37 percent of Tinker's military population, including AWACS military personnel.

3.4.12 MEDICAL CARE

The USAF Hospital at Tinker was completed in 1959. The hospital has an in-patient capacity of 40 beds and an average daily occupancy of 31.5 beds. Specialty services available include internal medicine, general surgery, pediatrics, flight surgeon, psychiatry, and gynecology. Psychiatric service is limited to a consulting physician and gynecology is limited to a nurse practitioner. Services that are authorized, but not available, include family practice, orthopedics, and ENT. A consulting staff is maintained for dermatology, ophthalmology, oral surgery, and urology.

Obstetrical care is not available at Tinker; this service was eliminated in 1972 due to the lack of available military physicians. Under the CHAMPUS program, women seeking obstetrical care may elect a physician of their choice from the community. For the 4-month period between July and October 1974, a monthly average of 36 claims were filed for obstetrical care. For this same time period, a monthly average of 57 claims were filed under CHAMPUS for other in-patient services authorized but not staffed at Tinker (orthopedics, family practice, ENT). Individual CHAMPUS certificates for in-patient care in civilian hospitals must be obtained from the base hospital. No comparable figures are available for outpatient care under the CHAMPUS program; since records

for such claims are maintained on an individual basis only, no tables are available.

The hospital offers its services to a community of about 42,000 persons, which includes approximately 10,200 active military personnel and their dependents and approximately 30,000 retired military personnel and their dependents.

The monthly total of out-patient visits was nearly 12,000 for FY 74. The base hospital does not extend its services to the civilian work force at Tinker. Occupational medical service is offered to the civilian population for injuries and disease incurred on-the-job, preplacement and required periodic physical examination, and a health education program. The annual outpatient workload for civilian employees was 55,000 for FY 74.

Currently, 28 physicians, 19 military and 9 civilian, are authorized for the Tinker hospital; 19 physicians, 13 military and 7 civilians, (four part-time civilian physicians are counted as two) are assigned to Tinker. The total authorized staff is 350, and 330 are assigned. During FY 75, the hospital anticipates a decrease in authorized staffing for nurses, nurses' aides, and laboratory and X-ray technicians. There will be no decrease in the number of authorized physicians.

In addition to medical care, Tinker offers complete dental care to military personnel, with only limited care offered to dependents and retired personnel. Monthly visits to the dental clinic total nearly 10,000.

3.4.13 EDUCATION

The U.S. Air Force encourages education for its personnel, and Tinker Air Force Base offers a wide range of educational programs to both the military and civilian work force.

For military personnel, courses are funded through the Air Force Tuition Assistance Program or the Veterans Administration. Approximately 350 military persons at Tinker further their education under these programs annually. A variety of programs are offered ranging from a MBA program in conjunction with Oklahoma City University, currently enrolling 36 students (33 military and 3 civilian), to the Pre-discharge Completion Program (PREP), funded by the V.A., which grants high school diplomas or equivalency certificates. The PREP program is coordinated with the Oklahoma City Public Schools. On-base programs are primarily for military personnel but are open to civilians when space is available.

Although limited tuition and duty time support is available for civilians, all civilians are encouraged to take part in further education. Annually about 1,300 civilians are enrolled in both credit and non-credit courses. Tuition reimbursement and duty time for civilians is distributed on a priority basis, with top priority assigned to engineers and members of the management team.

Area colleges and universities most frequently attended by both military and civilians under the tuition reimbursement program include Oscar Rose Jr. College (Midwest City), Central State University (Edmond), Oklahoma State University Technical Institute (Oklahoma City), and the University of Oklahoma (Norman).

3.5 SOCIOECONOMIC SETTING

3.5.1 AREA DESCRIPTION AND DEMOGRAPHICS

Tinker AFB is located in Central Oklahoma, in Oklahoma County and within the Oklahoma City Metropolitan Area, as shown in Figure 3.5.1-A. The immediate neighbors of the 4200-acre air base are Midwest City and Del City to the north and northwest and incorporated land of Oklahoma City to the south and east. The base is located approximately six and one-half miles southeast of downtown Oklahoma City, but less than two miles directly south of the municipal building complex for Midwest City.

As indicated in Table 3.5.1-A, the geopolitical divisions and statistical units that comprise and are used to describe the Oklahoma City Metropolitan Area are somewhat complex. Several dozen municipalities and numerous unincorporated areas make up a six-county area. These six counties,--Canadian, Oklahoma, Cleveland, Logan, Pottawatomie, and McClain--in various combinations are organized into the regional designations shown in the table, in order of ascending land area. Since the completion of the 1970 Census, the three-county Standard Metropolitan Statistical Area (SMSA) has been expanded to include McClain and Pottawatomie Counties. The state-designated planning region, Central Oklahoma under the planning jurisdiction of the Association of Central Oklahoma Governments (ACOG), encompasses the "central counties" (the three-county SMSA) and Logan County to the north, but not the two counties in the newly expanded five-county SMSA. Obviously, data for these three regional designations, although each includes the same three-county central area, is not comparable; where such regional data is given in this study, the appropriate regional unit will be identified. A further metropolitan planning area is a 1,250-square mile portion of the three-county SMSA (primarily in Oklahoma County) that is within the Oklahoma City Area Regional Transportation System (OCARTS).

3.5.1.2 Population Growth and Characteristics

Increases in the population of Central Oklahoma can be traced to notable events, significant to national, as well as local, history.

The area was settled literally overnight on April 21, 1889, by some 50,000 settlers in the great land rush. Between noon and sunset on that day, Oklahoma City, with over 10,000 inhabitants, appeared on the prairie [4]. The increased stability of statehood (in 1907) resulted in a doubling of population from 1900 to 1910--both in the State and in the region [11].

Prosperity marked the next twenty years during which time the regional population doubled once again, and this period ended with the opening in December of 1928 of the fabulous Oklahoma City oil field [4]. Throughout the years of the depression and the dust storms, rural to urban migration of small farmers brought a modest population increase to Central Oklahoma (7%), while the State as a whole lost over 2% of its population [11].

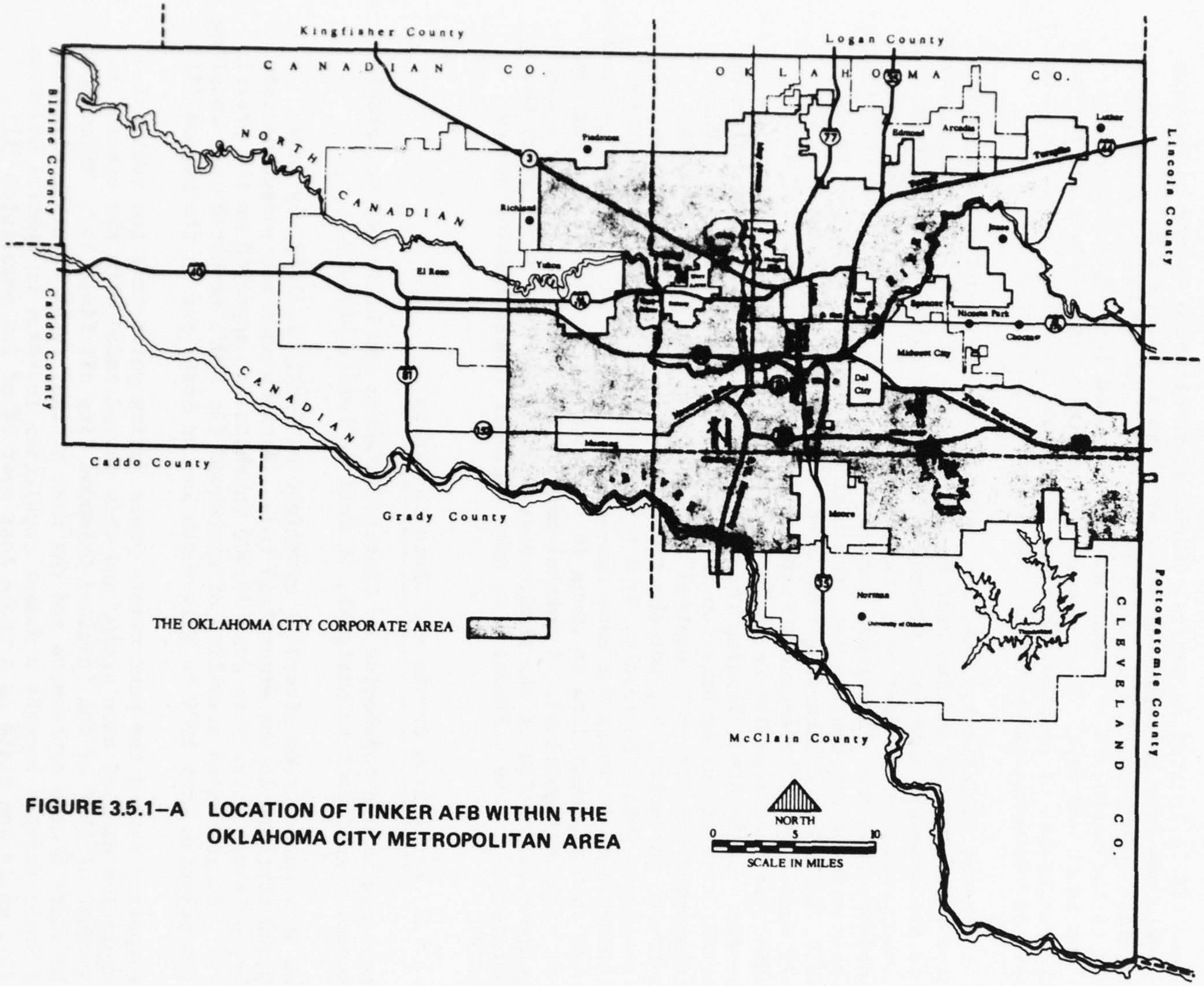

FIGURE 3.5.1–A LOCATION OF TINKER AFB WITHIN THE OKLAHOMA CITY METROPOLITAN AREA

Table 3.5.1-A Designated Regional Areas in the Oklahoma City Metropolitan Area

Area	Counties Included	Land Area (sq. miles)
Three-County Oklahoma City SMSA (1970 Census)	Canadian Oklahoma Cleveland	2,143
Association of Central Oklahoma Governments (ACOG) Region	Canadian Oklahoma Cleveland Logan	2,901
Five-County Oklahoma City SMSA	Canadian Oklahoma Cleveland McClain Pottawatomie	3,510

Sources: Association of Central Oklahoma Governments. Regional Land Use Plan for Central Oklahoma. Oklahoma City: By the Association, 1972.

U.S. Department of Commerce, Bureau of the Census. County and City Data Book. Washington, D.C.: U.S. Government Printing Office, 1972.

World War II brought greatly expanded employment opportunities to Central Oklahoma, notably the air maintenance and supply depot at Tinker Field and the Douglas Aircraft Plant, later combined as Tinker AFB at the conclusion of the war. Within two years of its start in 1941, Tinker Field was employing its war-time high of nearly 15,000 civilians [64]. In the same year, Midwest City sprang up as a new town to provide housing and community facilities for the new air depot [30]. This decade, 1940-1950, brought a nearly 30% population increase to the Region.

Between 1950 and 1970, annexation of land areas by municipalities in Central Oklahoma was significant. For example, Oklahoma City had a 33% population increase from 1950 to 1960 and a concurrent 424% increase in land area; an additional 383-square mile area was annexed between 1960 and 1970 [43]. In the case of Norman, 20% of the 1970 population resided in areas that had been annexed since 1960 [50].

Data from the 1970 census are presented in Table 3.5.1-B for the Oklahoma City Metropolitan Area and for the Tulsa and Lawton SMSAs and the State as a whole. The highest rates of population growth occurred in Cleveland County and in the municipalities of Bethany, Del City, Midwest City, and Oklahoma City, with that city accounting for 57 percent of the total population in the three-county SMSA. Oklahoma City was the fastest growing major city in the State; its 1960-1970 growth rate excluding population in areas annexed over that period was 10 percent, compared with -8.8 percent and -2.5 percent for Tulsa and Lawton, respectively [43]. Over this same period, the population density in Oklahoma City increased from 610 persons per square mile to 733 per square mile [43].

Selected social and economic characteristics of the population in the Oklahoma City Metropolitan Area are given in Table 3.5.1-C, with data for the State and other Oklahoma SMSAs for purposes of comparison. According to the 1970 Census, the Oklahoma City SMSA had a lower rate of unemployment and higher median family income than either of the other metropolitan areas or the State as a whole. Within the Oklahoma Metropolitan Area a wide diversity of population characteristics exists, as indicated by data in the table for individual counties and major municipalities. Population density, for example, ranges from 3,570 per square mile in Del City to 25 per square mile in McClain County [50]. As might be expected,of the six counties Oklahoma County had by far the highest percentage urban population.

3.5.1.3 Regional Trends and Projections

Continued growth has been projected for the Oklahoma Metropolitan Area; projections for five-year intervals between 1970 and 1990 are given in Table 3.5.1-D, along with comparable data for 1960-1970. As indicated in the table, both annual growth rate and decennial rate of change are expected to be lower than the figures for 1960-1970 [8,43]. Although the percentage of SMSA population in Oklahoma City is projected for a slight decline (58% in 1970 to 53% in 1980 [8]), Oklahoma City will still clearly be the population center for the Region.

Table 3.5.1-B Population According to the 1970 Census-Oklahoma City Metropolitan Area, Tulsa SMSA, and State of Oklahoma

Area	Population: 1970 Census	Population: % Change 1960-1970
State of Oklahoma	2,559,229	9.9
Tulsa SMSA	476,945	13.4
Lawton SMSA	108,144	19.1
Oklahoma City SMSA (Three-County)	640,889	25.4
Counties		
Canadian	32,245	30.4
Cleveland	81,839	71.9
Logan	19,645	5.3
McClain	14,157	11.1
Oklahoma	526,805	20.1
Pottawatomie	43,134	4.0
Major Municipalities[1]		
Bethany	21,785	76.5
Del City	27,100	109.8
Midwest City	48,221	51.2
Norman	52,128	49.4
Oklahoma City	366,734	52.5

[1]Population more than 20,000.

Sources: U.S. Department of Commerce, Bureau of the Census. County and Cita Data Book. Washington, D.C.: U.S. Government Printing Office, 1972.

Association of Central Oklahoma Governments. Regional Land Use Plan for Central Oklahoma. Oklahoma City: By the Association, 1972.

Table 3.5.1-C Selected Social and Economic Characteristics for Oklahoma City Metropolitan Area, Tulsa SMSA, and State of Oklahoma, 1970 Census

Area	Population		Median				
	Density (per square mile)	% Urban	Age (yrs)	School yrs. Completed[1]	Family Income	Unemployed (%)	Family Below Low-Income Level (%)
State of Oklahoma	37	68.0	29.7	12.1	$7,720	4.2	15.1
Tulsa SMSA	126	85.9	29.1	12.2	$9,281	4.6	9.8
Lawton SMSA	100	88.7	22.3	12.3	$7,286	7.0	14.3
Three-County Oklahoma City SMSA	300	94.7	27.3	12.3	$9,337	3.2	9.4
Counties							
Canadian	36	81.0	28.2	12.2	$8,451	2.8	10.2
Cleveland	155	83.4	23.7	12.5	$9,087	3.8	9.5
Logan	26	48.7	32.1	11.5	$6,747	4.2	17.4
McClain	25	29.2	32.2	10.5	$6,731	3.4	17.2
Oklahoma	754	97.4	28.0	12.3	$9,429	3.2	9.4
Pottawatomie	54	68.6	33.1	11.4	$6,978	4.0	17.3
Major Municipalities[2]							
Del City	3,570	---	25.4	12.4	$10,157	2.6	5.1
Midwest City	1,968	---	25.2	12.3	$ 9,662	3.5	7.9
Norman	300	---	23.5	12.8	$ 8,940	4.4	9.9
Oklahoma City	579	---	29.1	12.3	$ 9,098	3.3	10.6

[1]Persons 25 years old and over.

[2]More than 25,000 inhabitants

Source: U.S. Department of Commerce, Bureau of the Census. County and City Data Book. Washington, D.C.: U.S. Government Printing Office, 1972.

Table 3.5.1-D Population Projections for the Oklahoma City SMSA (Three County and Oklahoma City, 1970-1990)

	Three-County Oklahoma City SMSA	Oklahoma City
<u>1960-1970</u>		
1960 Population	511,833	324,253
1970 Population	640,889	368,856
% Change	25.2	13.8
Annual Growth Rate	2.3	1.3
<u>1970-1980</u>		
1970 Population	640,889	368,856
1975 Population	707,600	391,600
1980 Population	784,900	416,000
% Change	22.5	12.8
Annual Growth Rate	2.0	1.2
<u>1980-1990</u>		
1980 Population	784,900	416,000
1985 Population	841,500	446,000
1990 Population	905,400	479,900
% Change	15.4	15.4
Annual Growth Rate	1.4	1.4

Source: Oklahoma City Planning Department. <u>The Greater Oklahoma City Economy 1970 and Beyond</u>. Oklahoma City, Oklahoma: By the Department, 1974

3.5.2 COMMUNITY PLANNING AND DEVELOPMENT

3.5.2.1 Background

In modern metropolitan America most governing bodies, through "zoning" boards or commissions are empowered with authority to limit, exclude or preclude certain land uses and conversely authorize uses where it is in the overall interest of the community, as is indicated, for example, in a land use plan.

Characteristically, in the zoning process the planning staff will review a zoning or variance request in light of the community development or land use plan and make recommendations to the commission. Ultimate responsibility for rezoning lies with the commission. In many areas of the country where community land use or development plans do not exist, rezoning often lacks apparent rationale. Technical staff recommendations are left unheeded. The adoption of short- and long-range land use plans places a stronger impetus for commissions, who are often comprised of bankers, developers and realtors, among others, to adopt staff recommendations. Nonetheless, zoning actions do not and will not always conform to established land use plans, perhaps due as much to their inherent lack of comprehensiveness and detail as to the political and economic forces which shape a community.

An extraordinarily far-sighted and active metropolitan Oklahoma City community has throughout the years used the tools of government at hand to plan, zone, restrict, develop and purchase in the, thus far, successful endeavor to make adjacent land use compatible with that of Tinker AFB and aircraft operations. Rarely is this attitude of the "horse before the cart" planning encountered in airport environs.

In 1973, the Oklahoma Legislature enacted laws which established the political machinery by which cities might delegate the authority to develop long-range plans. This legislation* authorized the appointment of a city planning commission and a zoning commission, providing that, should a planning commission exist, it would act as a zoning commission. The planning commission was granted authority to hire staff and conduct planning work within the municipality.

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* Sections 401-425 of Title II, Oklahoma Statutes

Subsequently the cities that are most directly affected by the presence of Tinker and its aircraft operations including Oklahoma City, Del City, Midwest City and Spencer (see Figure 3.5.2-A) have planning staff and zoning commissions whose actions influence land use in the Tinker vicinity.

More than 90 percent of the people affected by aircraft operations at Tinker, as measured by noise and accident hazard potential (see Section 3.3.3.3), reside in Midwest City (north of Runway 17/35).

The greatest potential for future development which would be directly influenced by aircraft operations lies in the almost wholly undeveloped land south of Tinker which is for the most part within the political jurisdiction of Oklahoma City (see Figure 3.5.2-A). Given these facts, the focus of discussion of Tinker's impact on land use both presently and after the beddown of the AWACS aircraft will be Midwest City to the north and Oklahoma City to the south of Tinker AFB.

3.5.2.2 Distribution of Authority and Land Use Planning Efforts

The cities of Del City, Midwest City, Oklahoma City and Spencer have ongoing planning programs. Both Midwest City and Del City have published land use plans [30, 69]. Oklahoma City is in the process of developing a comprehensive land use plan which will become part of a multi-volume planning document.

Coordination with metropolitan agencies and political bodies is facilitated by the Association of Central Oklahoma Governments (ACOG). "The purpose of ACOG is to review, on a voluntary basis, the planning programs of the various metropolitan area governments and to collect data to assist in the creation of comprehensive areawide planning [30]." ACOG's role in land use planning is advisory in nature rather than manditory. In 1972 ACOG published a Regional Land Use Plan for Central Oklahoma [32], which very broadly defines future land use alternatives based on spatial suitability of the natural environment (i.e. soil, slope, vegetation, water, etc.) as well as availability of community services and facilities.

Lacking legislative authority, ACOG's plan is, as previously mentioned, advisory. Nonetheless, ACOG has some very distinct influence on the flow of federal grant-in-aid funds in the metropolitan area which may effect land use.

"The A-95 review is a process established by the Federal Office of Management and Budget (OMB) which provides for the review of a wide variety of project applications for federal funding." The intent of the OMB A-95 clearinghouse review process is to insure that funds expended by federal agencies do not in some way negate or are themselves negated by mutually overlapping or conflicting projects or programs. ACOG is the regional clearinghouse in the Oklahoma City metropolitan area. ACOG, which reviews all grant applications and forwards comments and recommendations to the

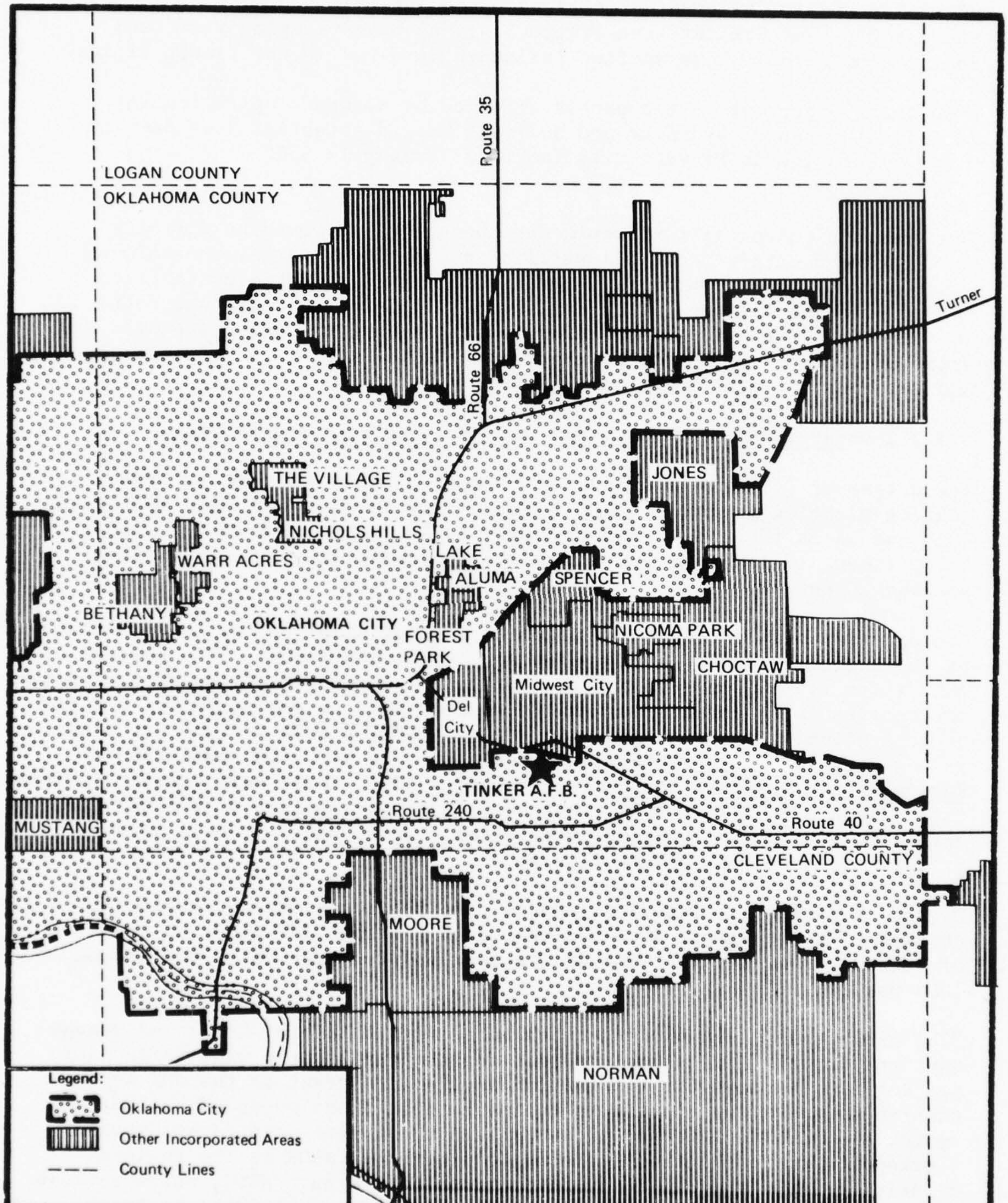

FIGURE 3.5.2–A TINKER AFB AND POLITICAL SUBDIVISIONS OF THE OKLAHOMA CITY METROPOLITAN AREA

responsible federal agency via the state level clearinghouse. The federal agency will use these comments and recommendations in their decision making process.

Many federal grant programs which ACOG reviews have direct influence on land use. Among these are:

1. Department of Housing and Urban Development (HUD)

   - Urban planning
   - Urban renewal and neighborhood development
   - Mass transportation
   - Urban beautification
   - Code enforcement
   - Preservation of historic areas
   - Construction of neighborhood facilities
   - Construction of water and collection sewer facilities

2. Department of Health, Education and Welfare

   - Construction of hospitals
   - Construction of schools
   - Communication facilities
   - Library construction
   - Community mental health programs

3. Soil Conservation Service

   - Drainage studies
   - Soil studies
   - Watershed development

4. Bureau of Outdoor Recreation

   - Aquisition and development of parks, open space and recreation areas

5. Environmental Protection Agency

   - Municipal sewerage facilities

Additionally, the Department of Transportation and the FAA provide assistance for airport development.

The Air Force, represented by the Tinker Base Civil Engineer, has entered into a "memorandum of understanding" [70] with ACOG to insure coordination in the event that actions taken at Tinker impact certain members of ACOG.

In summary, control of development as it conforms to zoning, is in the elected officials of the communities surrounding Tinker. ACOG has a coordinating review and land planning guidance responsibility for the metropolitan area.

3.5.2.3 Existing Land Use and Land Use Trends

Land use patterns are the result of a complex set of historical, economic, social and political interactions. A historical analysis of land use trends and urban development in the Tinker AFB vicinity is beyond the scope of this study, however, several deliberate actions have taken place in the past three decades which lend distinction to the community as being airport planning conscious and, therefore, warrant mentioning.

Figure 3.5.2-B is a map of Tinker and adjacent Midwest City which is taken from USGS 1969 photo revision quadrangles. Figure 3.5.2-C and 3.5.2-D are photographs which represent what a pilot sees approaching Tinker runway 17/35 from the south and from the north, respectively. These figures should be used in reference to the following general discussion.

Midwest City, which is approximately twenty-five square miles, was founded in 1941 on the proposition that the then Department of the Army would establish an airbase facility in the area. The original land aquisition consisted of 310 acres adjacent to and north of Southeast 29th Street. Subsequent events resulted in the establishment of a large community which supports Tinker AFB in a variety of ways. For example, a large majority of the approximately 20,500 civilians employed at Tinker AFB occupy, along with military personnel and their families, many of the more than 16,800 homes in Midwest City (73.5 percent of which are owner occupied) [71].

Airport zoning ordinances [29] adopted initially in 1960 by Midwest City and later by Del City restricted development in designated zones insofar as the height of structure, radio communication, interference and distractive lighting. In 1968 Midwest City obtained a matching BOR grant for development of a $3.5 million city park in the approach zone of the north main runway. Industrial zoning has been achieved at the north end of the runway which will preclude other less compatible uses.

The most significant action taken to achieve compatible land use with Tinker's aircraft operations was the Oklahoma County-wide passage of a $10.8 million capital improvement bond issue which provided for the acquisition of 320 acres of the Glenwood Addition on the north approach to the main runway (17/35), removal of 836 homes and eight business establishments, and discontinued use of an elementary school (see Figure 3.5.2-B). As of June 1974, 155 homes had been removed and 244 homes were purchased from owners.

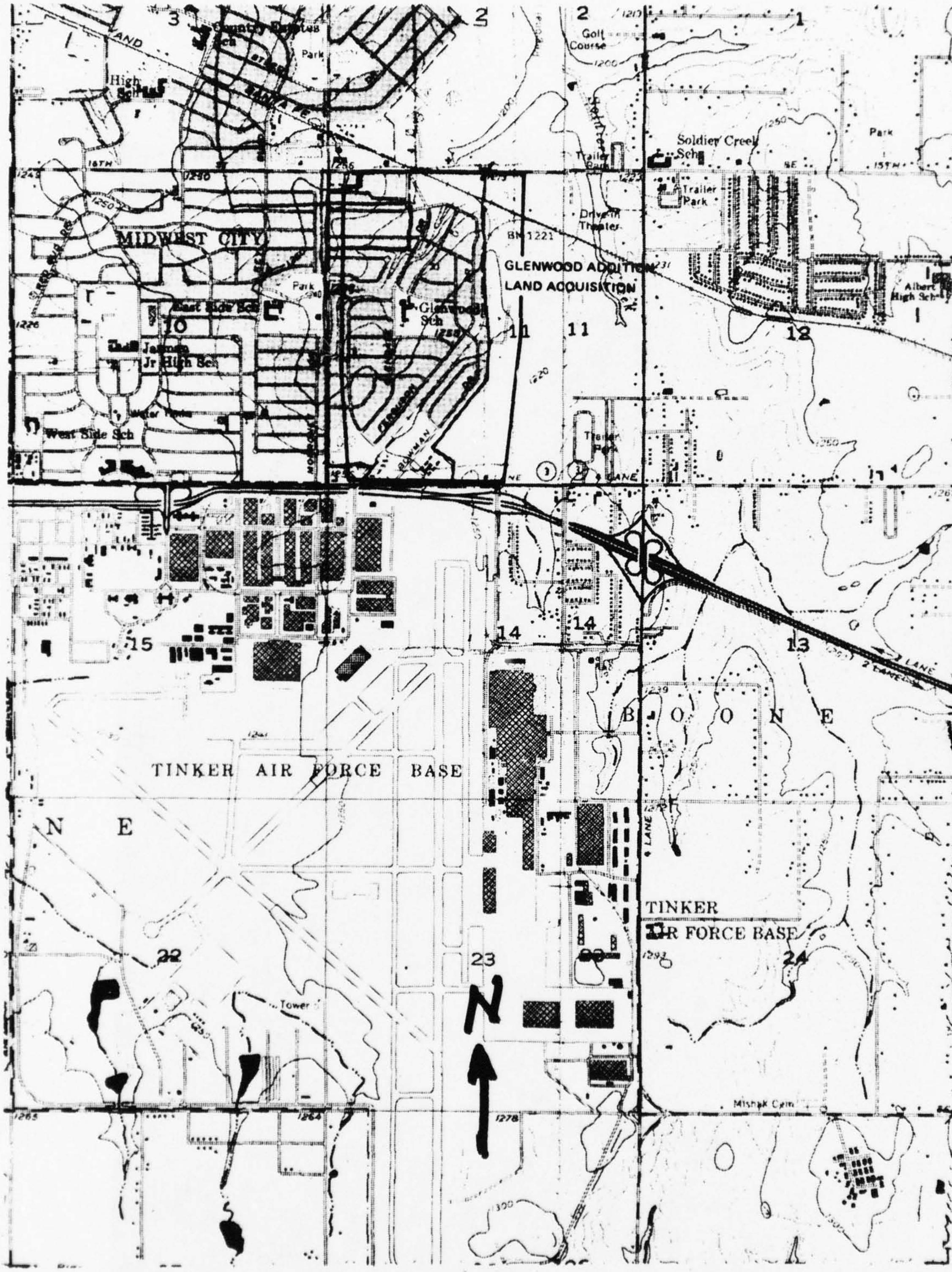

FIGURE 3.5.2–B GENERALIZED LAND USE OF VICINITY NORTH OF TINKER AFB SHOWING LOCATION OF GLENWOOD ADDITION, LAND ACQUISITION

FIGURE 3.5.2–C LOOKING NORTH TOWARDS TINKER AFB

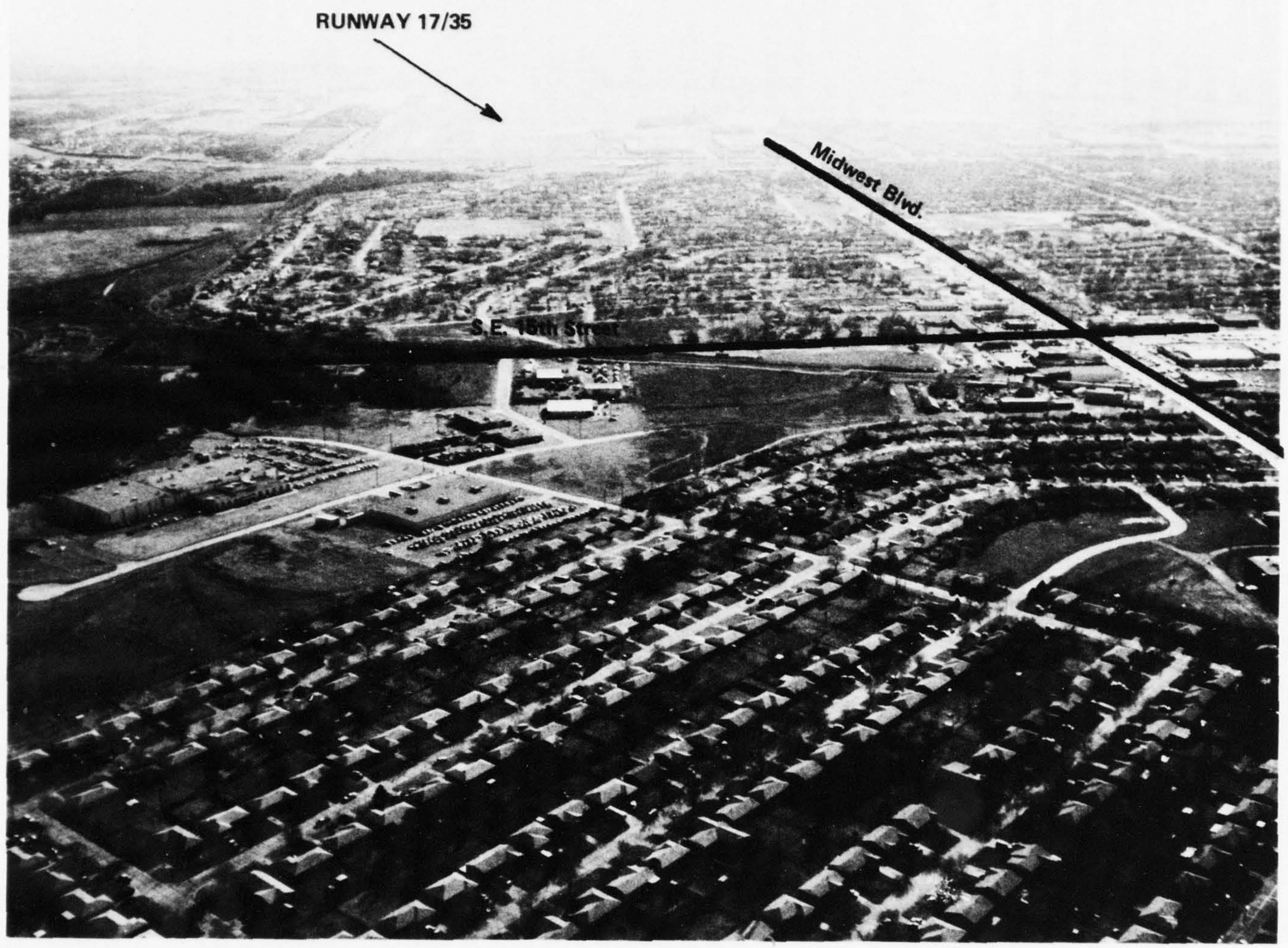

FIGURE 3.5.2-D LOOKING SOUTH TOWARDS TINKER AFB

In comparison with that area adjacent to and north of Tinker, little positive action has been taken to insure that future development of the area to the south will be compatible with aircraft operations. As shown in Figure 3.5.2-C the area south of Tinker is virtually undeveloped. Development pressures have not been strong enough to provide for the construction of sewers, water, roads, and other public utilities which support urban use. At present that land to the south of Tinker which is under the political jurisdiction of Oklahoma City is zoned agricultural. This is the lowest of zoning designations, allowing for only one residence per 5 acres. The relatively low value of land coupled with urban expansion pressures suggest development of the area may occur. However, there is a natural deterrant to immediate development, namely the lack of access and utilities.

The availability of sewers will play a prominent role in the area's growth. There is a natural hydrologic divide which separates the existing Oklahoma City sewerage system (a gravity flow system) from the undeveloped area. Oklahoma City is faced with serious water pollution problems which place the emphasis on improvement of the existing system rather than expansion. Metropolitan Oklahoma City's relatively low average population density has made the per capita expense of pollution control high. The EPA, which funds sewerage transport and treatment systems cannot fund development oriented systems. Nonetheless, so called "interim" package-plant type facilities or sewage lagoons may be approved to serve individual developments, a trend the EPA and State Water Pollution Control agencies are trying to reverse. ACOG has recently been awarded an EPA grant to conduct a two-year Areawide Waste Treatment Management Planning Study which will define long-range sewer needs in the area. Future EPA sewerage facilities construction grants will be awarded contingent upon the conformance with the adopted "Areawide" plan. Plans are underway by the Corps of Engineers to construct a holding lake west of Stanley Draper Lake that would be situated within the flight path of approaching and departing aircraft. This action will preclude other land uses in the affected area.

In summary, land use is intensive north of Tinker. To the south, little development has occurred. With the adoption of a long range land use plan for Midwest City, and considering the active interest of Midwest City in insuring compatible land use adjacent to Tinker to the north, there are few uncertainties regarding its fate of future development. On the other hand little is certain with regard to the potential development and subsequent compatibility of land south of Tinker.

Tinker impact on land use for its present mission is discussed in Section 3.3.3.3 and for the AWACS mission (post 1981) refer to Section 4.2.4.

3.5.3 ECONOMY

3.5.3.1 Area Economic Characteristics

Non-manufacturing activity is the predominant source of employment in the Oklahoma City SMSA, as well as in the State of Oklahoma, as shown in Table 3.5.3-A [7]. In 1970, 85% of all employment in both areas was provided by this sector. Agriculture, although it provided 13.2% of employment state-wide, accounted for less than 2% of employment in the Oklahoma City SMSA. Except for Federal government employment, other major sectors of the economy provide comparable levels of employment in the State and the SMSA.

In 1970, over one quarter of all employment in the Oklahoma City SMSA was attributable to government activity--Federal, state, and local [7]. Approximately one-half of this government employment (nearly 34,000 civilian jobs) was provided by Federal activities, including major installations such as Tinker AFB, the Federal Aviation Administration, the U.S. Postal Service, the Veterans Administration, and the Internal Revenue Service in order of descending importance [7]. (The major role played by Tinker AFB in the economy of the Oklahoma City Metropolitan Area is discussed further in Section 3.6.2 of this statement.) Of state-wide Federal Government employment, 59% was located in the Oklahoma City SMSA, as indicated in Table 3.5.3-A. In terms of total personal income for the Oklahoma City SMSA in 1970, Federal Government employment accounted for 15.6% of the total income (vs 12.9% of total employment), a figure resulting from the fact that this sector also provided the highest mean annual wage: $10,375 compared with an area average of $7,381 and an average of $9,688 for the next highest paying industry group, mining [7].

In addition to the significant Federal Government activity, Oklahoma City, as the capital of the State of Oklahoma, is the location of major state governing bodies and agencies, as well as of institutions of higher education (notably the University of Oklahoma at Norman and Central State University in Edmond). Together, state and local government (local public schools and municipal governments) accounted for a 1970 employment of 36,800 or 14% of all employment [7].

Employment in various manufacturing activities totaled over 38,300 (14.5% of all employment) in the Oklahoma City SMSA in 1970 [7]. Manufacture of durable goods, including fabricated metal products, machinery, and transportation equipment, accounted for 65% of this employment [7]. Food processing provided nearly one-half of employment in manufacture of non-durable goods, with the apparel and printing industries accounting for most of the remainder [7].

The Oklahoma City SMSA maintains an unemployment rate below that of the State or the nation. In 1970, unemployment in the three-county SMSA averaged 3.8%, below the rates for Tulsa (4.8%), the State of Oklahoma (4.4%), and the U.S. (4.4%) [41]. A manpower review in October of 1974 revealed unemployment in the five-county SMSA at a rate of 4.4%; the national figure for the same month was 5.7% [42].

Table 3.5.3-A Employment in 1970 by Major Sector, Oklahoma City SMSA and State of Oklahoma

	State of Oklahoma		Oklahoma City, SMSA[1]	
	1970	% of 1970 total	1970	% of 1970 total
Manufacturing	133,900	15.0	38,300	14.5
Non-manufacturing	753,100	85.0	225,200	85.5
Construction	37,400	4.2	13,900	5.3
Government	185,300	20.9	70,700	26.8
Federal	57,500	6.5	33,900	12.9
State and Local	127,800	14.4	36,800	14.0
Transportation and Public Utilities	52,400	5.9	16,900	6.4
Finance, Insurance and Real Estate	37,000	4.2	15,800	6.0
Trade	168,000	19.0	58,300	22.1
Wholesale	40,800	4.6	15,685	5.9
Retail	127,900	14.4	42,615	16.2
Service	115,900	13.1	38,100	14.4
Mining	38,900	4.4	7,000	2.7
Agriculture	117,500	13.2	4,500	1.7
TOTAL	887,000	100.0	181,400	100.0

[1] Canadian, Cleveland, and Oklahoma Counties

Source: Oklahoma City Planning Department. The Greater Oklahoma City Economic Base 1960 to 1970. Oklahoma City, Oklahoma: By the Department, 1974.

3.5.3.2 Area Economic Trends

The period 1960 to 1970 was a period of rapid economic development for the Oklahoma City Metropolitan Area. Increases in both employment and population over that period were nearly double the rate of similar increases in the nation as a whole and in the State of Oklahoma (see Table 3.5.3-B) [7]. In the Oklahoma City SMSA, growth of total personal income from 1960 to 1970 was 18 percent greater than in the U.S. and 23 percent greater than in the State [7]. Projections for the regional economy up to 1980 include continued growth, but at a less dramatic pace; ten-year population and employment increases of 22.5 percent and 32.6 percent, respectively, are predicted to accompany a 68.2 percent increase in total personal income [8].

Employment trends since 1960 and projections to 1980 by employment sector for the Oklahoma City SMSA (Cleveland, Canadian, and Oklahoma Counties) are given in Table 3.5.3-C.

Manufacturing accounted for the largest percentage employment increase between 1960 and 1970 and the highest annual increase (11.4 percent) in personal income [7]; by 1980, this sector (dominated by transportation equipment) is expected to grow by nearly 17,000 jobs and to account for a 92.8 percent growth in total personal income. Services, the fastest growing sector during the 1960's, is expected to continue in this role [7, 8]; by 1980 services is projected to be the third largest employer in the region [8, 11].

The slowly declining role of the Federal government in regional employment (14.8 percent in 1960 to 12.9 percent in 1970) is expected to continue; by 1980 9.7 percent of total employment is projected to be provided by Federal activities [8, 11]. On the other hand, state and local government employment will grow by an estimated 45 percent by 1980, and total government employment will still account for 25 percent of all employment in the region and 21 percent of total personal income [8].

Trade, which accounted for 22 percent of area employment in 1970, is expected to maintain this same proportion of employment by 1980 [8]. This sector--together with services, government, and manufacturing-- will provide 79 percent of total area employment in 1980 and 63 percent of total personal income [8].

Table 3.5.3-B Rate of Economic Development as Measured by Increases in Employment, Population, and Total Personal Income, 1960-1970, U.S., Oklahoma, and Oklahoma City SMSA

	% Increase 1960-1970		
	Employment	Population	Total Personal Income
U.S.	24.1	13.3	101
Oklahoma	20.3	9.9	96.8
Oklahoma City SMSA[1]	45.3	25.2	118.9

[1] Cleveland, Canadian, and Oklahoma Counties.

Source: Oklahoma City Planning Department.
<u>The Greater Oklahoma City Economic Base 1960 to 1970</u>.
Oklahoma City, Oklahoma
By the Department, 1974

Table 3.5.3-C Employment Trends and Projections, Oklahoma City SMSA, 1960-1980

Sector	Employment in Oklahoma City SMSA[1]				
				% Change	
	1960	1970	1980	60-70	70-80
Manufacturing	20,300	38,300	55,000	88.7	43.6
Construction	12,000	13,900	20,300	15.8	46.0
Government	47,300	70,700	87,600	49.5	23.9
Federal	26,800	33,900	34,000	26.5	.3
State and Local	20,500	36,800	53,600	79.5	45.6
Transportation and Public Utilities	13,200	16,900	20,900	28.0	23.7
Finance, Insurance, and Real Estate	10,600	15,800	21,100	49.1	33.5
Trade	43,200	58,300	76,800	35.0	31.7
Services	22,000	38,100	56,200	73.2	47.5
Mining	7,000	7,000	7,500	0	7.1
Agriculture	5,800	4,500	3,900	-22.4	-13.3
TOTAL	181,400	263,500	349,300	45.3	32.6

[1] Canadian, Cleveland, and Oklahoma Counties.

Sources: Oklahoma City Planning Department. The Greater Oklahoma City Economic Base 1960 to 1970. Oklahoma City. Oklahoma: By the Department, 1974

Oklahoma City Planning Department. The Greater Oklahoma City Economy, 1970 and Beyond. Oklahoma City, Oklahoma: By the Department, 1974.

3.6 TINKER'S SOCIOECONOMIC INFLUENCES ON THE COMMUNITY

3.6.1 SOCIAL SERVICES

3.6.1.1 Housing

A major influence of Tinker AFB on its surrounding community is the housing requirements of its military and civilian work force, numbering about 21,500.

As discussed in Section 3.4.11, Tinker currently provides housing for 1,394 military personnel on base property. The remaining approximately 1,700 military personnel and all of the approximately 18,500 civilian employees reside in the communities surrounding Tinker AFB. It is estimated that about 80% of the military personnel residing off-base live in the Midwest City and Del City area. The remainder are scattered throughout the five-county Oklahoma City SMSA.

The best indication of where civilian employees reside is provided by a 1968 study entitled Economic and Social Characteristics of the Oklahoma City Air Materiel Area. The data contained within this report was compiled from existing Oklahoma City Air Materiel Area (OCAMA) records maintained by the Personnel Division on all employees and from a questionnaire distributed to employees in June 1967, when the total OCAMA civilian work force was 23,885. Of this total, 20,786 employees participated in the survey or 87% [6]. The total OCAMA (now ALC) civilian work force for FY 74 was 18,872.

In 1967, the OCAMA drew its work force from 29 Oklahoma counties, with approximately 77% of this work force residing in Oklahoma County and about 94% residing within the five-county Oklahoma City SMSA. Within Oklahoma County, OCAMA employees tended to be concentrated in urban areas--47% in Oklahoma City, 30% in Midwest City, and 13% in Del City. In 1967, 23% of all OCAMA employees lived outside of Oklahoma County in contrast to 17% in 1960. It may be assumed that the number of OCAMA employees residing outside of Oklahoma County has increased somewhat since 1967 due to the construction of major highways from Oklahoma City to other areas of the state. It is also reasonable to assume, however, that the majority of OCAMA employees still reside within the Oklahoma SMSA and will continue to do so in the future.

Within the Oklahoma City area, housing has been traditionally available and economical, but, with the current decrease in building and high interest rates, suitable housing, particularly for military personnel, is less readily available. Growth in the five-county Oklahoma City SMSA from 1960 to 1970 saw the addition of 55,918 housing units increasing

the total from 192,479 to 248,397 units. In 1970, of these 248,397 housing units, 229,388 were occupied and 12,357 were vacant year-round units. Of the occupied units, 68% were owner-occupied and 22% were renter-occupied. On the vacancy side, 25% were for sale and 75% were for rent. Based on the vacant year-round units, the 1970 vacancy rate was 5%.

The quantity of housing in the region continued to grow considerably between 1970 and 1972, and at that time such growth was anticipated to continue. During the first eight months of 1971 for a sub-portion of the region,* there were 3,010 housing starts as opposed to 1,891 starts for the same period in 1970. During this same period, there were 6,868 starts on apartment units as opposed to 4,292 units during the comparable 1970 period [32]. Since 1971, the number of housing starts has decreased in the face of high land and building costs and high interest rates. In Midwest City, where a high percentage of OCAMA employees and military personnel live, there were 429 housing starts in 1971, 262 in 1972 and 161 in 1973. For the period between January and October 1974, there were only 88 housing starts. The number of apartment starts in Midwest City was 201 units in 1971, 1,609 in 1972 and 392 in 1973. Building activity has declined markedly but has not completely stopped.**

In 1974, a 25 percent vacancy rate for apartments in the Midwest City and Del City area existed. Of these apartments, approximately 85% are one- or two-bedroom units, and 15 percent are units of three or more bedrooms. The vacancy rate for single-family homes has decreased since 1970 to somewhat less than 3 percent for the Oklahoma City area.

In 1972, the mean housing value for the Oklahoma City area was $14,223.28, which was higher than the mean of $10,645.42 for the State of Oklahoma as a whole, but well below the national average [32].

The Housing Referral Office (HRO) at Tinker AFB assists all base personnel in locating off-base housing. The 1976 "Family Housing Survey" revealed a total of 2,372 military families eligible for on-base housing (E-4 rank and above). With only 532 on-base housing units, 1,751 eligible military

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* Includes Oklahoma City, Nichols Hills, Warr Acres, Bethany, Midwest City, Del City, Village, Edmond, Yukon, Moore and the unincorporated area of Oklahoma City.

** Personal Communication, Grover Phillips, Midwest City Chamber of Commerce, Midwest City, Oklahoma, November 5, 1974.

families were forced to locate off-base housing. A deficiency in suitable off-base housing [suitability based upon a reasonable commuting distance, reasonable cost and size (no. of bedrooms) requirements] was found to exist particularly for homes with one or two bedrooms or with four or more bedrooms. A deficiency in suitable off-base housing was also indicated for military persons ineligible for on-base housing (E-3 rank and below).

Previously about 30% of military personnel arriving at Tinker and requiring off-base housing chose to buy a home; currently this figure is only about 7% due to the high interest rates. Despite the high vacancy rate for apartments, these facilities do not generally meet the needs of military families due to size requirements and/or cost. Most military families prefer a single-family home for which the vacancy rate is low. Additionally, of those vacant houses many are not considered suitable.

Another measure of Tinker's impact on housing is the safety hazard associated with aircraft operations. This problem has led to the scheduled removal of an 800-unit housing development and school in Midwest City north of Runway 17/35. This impact is discussed in Section 3.5.2.

3.6.1.2 Education

Tinker AFB has a significant impact on the local school system. Because about 80 percent of Tinker employees living off-base reside within Oklahoma County this discussion will emphasize the school districts within this area.

Federal impact funds are appropriated and distributed each year to local school systems in accordance with the number of dependents of employees of the Federal Government. Surveys are conducted each year in order to ascertain the number of such dependents; the data shown in Table 3.6.1-A is derived from surveys during the 1973-1974 school year for all school districts within Oklahoma County.

Funding under Public Law 874 is distributed for two categories of dependents. Class A dependents are those residing on federal property; in fiscal year 1973-1974 the level of funding for each A dependent was $463. All dependents of federal employees not residing on federal property are category B for which funding was $231.

Table 3.6.1-A

Dependents of Federal Employees in
Oklahoma County School Districts, 1973-1974

School District	Membership[1]	Number of Federal Dependents[2]	% Federal Dependents
Putnam	21,963	1683	8%
Luther	450	33	7%
Choctaw	3,594	905	25%
Deer Creek	561	23	4%
Harrah	1,414	372	26%
Jones	848	94	11%
Edmond	6,290	348	6%
Millwood	1,066	213	20%
Western Heights	4,106	451	11%
Midwest City	20,166	7230	36%
Crooked Oak	1,701	839	49%
Bethany	929	59	6%
Oklahoma City	58,087	5348	9%
Oakdale	92	0	0
Crutcho	387	62	16%
Total	121,654	17,660	15%

1. Oklahoma State Department of Education. Annual Statistical Report to the State Department of Education (year ending June 30, 1974). Oklahoma City, Oklahoma: State Department of Education, 1974.

2. Personal Communication, John Mayberry, Director, School Plant Services, State Department of Education, Oklahoma City, Oklahoma, December 20, 1974.

Table 3.6.1-B

Dependents of Tinker AFB Employees in Oklahoma County and Selected School Districts, 1973-1974

	Oklahoma County	Midwest City	Oklahoma City	Crooked Oak	Millwood	Harrah	Choctaw
Class A dependents[1]	1,011	960	-	13	-	16	-
Tinker	960	960		0		0	
% Tinker	95	100		0		0	
Class B dependents[1]	16,649	6270	5348	826	213	356	905
Tinker	11,654	4389	3744	578	149	249	634
% Tinker[3]	70	70	70	70	70	70	70
Total Federal dependents	17,660	7230	5348	839	213	372	905
Tinker	12,614	5349	3744	578	149	249	634
% Tinker	71	74	70	69	70	67	70
Average Total Membership[2]	121,654	20,166	58,087	1701	1066	1414	3594
% Federal dependents	15	36	9	49	20	29	25
% Tinker dependents	10	27	6	34	14	18	18

1. Personal Communication, John Mayberry, Director, School Plant Services, State Department of Education, State Capital Complex, Oklahoma City, Oklahoma, December 20, 1974.

2. Annual Statistical Report to the State Department of Education (year ending June 30, 1974), Finance Division, State Department of Education, State Capital Complex, Oklahoma City, Oklahoma.

3. Based on the 1970 estimate that 70% of all federal employees work at Tinker AFB. City of Oklahoma City, Department of Planning. The Greater Oklahoma City Economic Base 1960 to 1970. Volume I of the Economic Element. By the City, January 1974.

Federal funds received under PL 874 by the Oklahoma County School System in 1973-1974 were about $2,454,100.00. The greatest number of federal dependents is concentrated within the Midwest City and Del City School District which received approximately $1,224,147.00 in federal funds for 1973-1974.* Table 3.6.1-B indicates the approximate percentage of dependents of Tinker employees for the school districts with the highest percentage and/or number of federal dependents.

Class A dependents from Tinker AFB attend schools within Midwest and Del Cities, Independent District No. 52. During the 1974-1975 school year, children residing on the base were assigned to the following schools accounting for the given percentage of the total membership: Tinker Elementary (98%), Carl Albert Junior High (35%), and Carl Albert Senior High (16%). Currently, the schools within this district are operating at or very close to capacity with the exception of Parkview Elementary which was first opened in September of 1974.**

3.6.1.3 Recreation

Numerous recreational facilities are located in the communities surrounding Tinker AFB. In Midwest City, where a large percentage of Tinker's military personnel and employees reside, there is the recently completed 325-acre Midwest City Regional Park. This facility offers an 18-hole golf course, swimming pool, tennis courts, picnic and playground areas. In addition, Midwest City contains nine other parks totaling 400 acres.

Water-based recreation areas are abundant within the Oklahoma City SMSA. In Oklahoma County, Lakes Hefner and Oberholser offer varied recreational opportunities. Located three miles south of Tinker AFB in Cleveland County is one of the state's newest reservoirs, Stanley Draper Lake, a 1,300-acre water-based recreation area offering fishing, boating, sailing, and water-skiing. Also located in Cleveland County is Lake Thunderbird which offers traditional recreational activities along with the excellent camping areas. Hunting and fishing is excellent throughout the five-county area.

In light of the varied recreational facilities offered in the surrounding area and at Tinker AFB (see Section 3.4.10), personnel from the base do not have a major impact on recreational facilities.

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* Personal Communication, J.E. Sutton, Superintendent of Schools, Midwest City-Del City School System, Midwest City, Oklahoma, January 2, 1975.

** Personal Communication, Ron Millican, Administrative Assistant, Independent District No. 52, Midwest City, Oklahoma, November 22, 1974.

The Midwest City Regional Park is located within the general orientation of the Tinker AFB flight pattern and Stanley Draper Lake is located in close proximity to the southern approach pattern to Tinker AFB. Aircraft hazards are discussed in Section 3.3.3.3.

3.6.1.4 Health Services

Tinker AFB is located within the Central Oklahoma area of the Area-wide Health Planning Organization (AHPO). The AHPO for Central Oklahoma is responsible for providing assessment of the need for various health services within the four-county community of Oklahoma, Canadian, Cleveland, and Logan Counties. Within this area are numerous hospitals, clinics and nursing homes.

AHPO undertook a study to assess the 1974 and projected (1975-1985) market for short-term hospital beds in Oklahoma, Canadian, Cleveland and Logan Counties. Involved in making projections of future hospital bed need are the past use of area facilities, population projections, current bed capacity and planned construction. During the 1973 calendar year, area hospitals provided a total of 1,032,468 patient days of service. A total of 754,218 days were provided to persons living within the four-county AHPO area and 278,230 days to persons living outside the AHPO area but within the State of Oklahoma. Since 1967, the area-wide hospital occupancy has steadily dropped from 82% to the 1972 annual average of 71%. Reflected within this decrease are the low utilization of obstetrical/maternity beds, pediatric beds and some critical care unit beds. The highest utilization has been in medical/surgical beds and the demand has resulted in waiting time in some cases [38]. In 1973, there were 58 nursing homes in the area with a utilization rate of 88.3% [37].

Based on the Hill-Burton formula, using an 85% occupancy rate as the optimal criteria for bed utilization, AHPO determined that the bed need for the four-county area would range from a total of 3,398 by December 31, 1974 to 4,131 by December 31, 1985. The projected hospital bed capacity for the 22 area hospitals and clinics is 4,442 in 1974, and 5,382 in 1985, if present plans are followed. It appears that currently there is a 1,044 net bed surplus in the area and this will increase to 1,469 in 1978 and begin to decline thereafter to 1,251 in 1985. This represents an average bed surplus of 1,394 between 1974 and 1985 [38, 39].

Of the about 21,500 persons at Tinker AFB, the majority (about 18,500) are civilians. Except for treatment of occupational injuries, these employees are not eligible for medical care in the clinics or hospitals at Tinker. Military personnel and their dependents are provided comprehensive medical services, free of charge, at the Tinker Hospital. Since most military persons live within 15 miles of the base, they presumably take advantage of this service. Dependents of active military personnel are eligible for the CHAMPUS program, which reimburses for medical services sought in the civilian community. Approximately 90 such certificates for in-patient care are issued each month. No data is available concerning out-patient care for military personnel and dependents under the CHAMPUS program.

Within Midwest City, two hospitals (Coyne Campbell Hospital and Midwest City Memorial Hospital) and three nursing homes lie within the general orientation of the north approach zone. Land use within aircraft noise and accident hazard areas is discussed in Section 3.3.3.5.

3.6.2 ECONOMY

Tinker's major direct influences on the economy of the Oklahoma City Metropolitan Area are the employment it provides and the goods and services it purchases. Both of these types of expenditures by the base also have significant secondary effects on the regional economy.

3.6.2.1 Military and Civilian Payroll

Through its payroll, Tinker AFB is a major economic force in not only the Oklahoma City Metropolitan Area but also the State of Oklahoma.

In 1970, Tinker provided 70 percent of all Federal employment in the Oklahoma City area; this was only a slight reduction from 1960 when Tinker accounted for 72 percent. The approximately 24,000 jobs provided by Tinker AFB in 1970 accounted for 34 percent of all area employment in the Government sector and for 9 percent of total area employment [7].

Tinker AFB is the single largest employer in the entire State of Oklahoma [13]. In 1970 it provided 40 percent of Federal employment in the State and 3 percent of total employment [7].

In Table 3.6.2-A, employment and payroll data are given for Tinker AFB as of December 1974. Of the total of nearly 24,000 employees, 83 percent are civilians. The annual payroll is nearly 300 million dollars.

Although no precise information is available concerning what portion of the Tinker payroll is spent in the local economy, some approximations are possible. A national average of disposable income (79.1 percent, disposable income less savings [62])applied to the Tinker AFB payroll, yields a total of more than 225 million dollars.

If 1968 residence patterns of Tinker civilian personnel are applied to the current civilian work force at the base, payroll totals by municipality of employee residence may be estimated as shown in Table 3.6.2-B. (Data is given for communities in which more than 200 personnel resided. In 1968, 86 percent of the civilian work force was concentrated in these areas [6]). Obviously Tinker personnel have a significant economic impact on the areas in which they live; they have a sizeable investment in real estate--by either rental or purchase. As patrons of local banks and other service and retail establishments, they and their dependents constitute a significant force in the local economy. In some areas, this impact is particularly concentrated. For example, one quarter of the 1974 resident work force in Midwest City is employed by Tinker AFB.*

* Personal Communication, Mr. Grover Phillips, Midwest City Chamber of Commerce, November 7, 1974.

Table 3.6.2-A Employment and Payroll of Tinker AFB as of December 1974

Employee Classification	Number	Annual Payroll
Military	3,630	$ 37,515,724[1]
Civilian (USAF)	19,744	$ 245,121,133
Base exchange personnel	327	$ 1,670,652
Non-appropriated fund personnel	141	654,025
TOTAL		284,961,534

[1]Estimated.

Table 3.6.2-B Tinker AFB Civilian Payroll (1974) Distributed According to Estimated Location of Residence of Personnel

Civilian Personnel Residence	Estimated Total Payroll[1]
Oklahoma City	$90,700,000
Midwest City	56,000,000
Del City	25,000,000
Shawnee	14,000,000
Norman	8,000,000
Moore	6,900,000
Choctaw	3,600,000
Tecumseh	2,800,000
Edmond	2,500,000
Guthrie	2,450,000

[1]A 1968 survey of social and economic characteristics of 20,786 civilian employees at Tinker AFB revealed residence patterns of this work force. These same percentages of personnel residing in each of the listed communities have been applied to the current civilian payroll, as an estimate of current total payrolls.

Military personnel, many of whom live in the civilian community are also important contributors to the local economy, although military housing (provided for 40 percent), base commercial services (base exchange and commissary), and on-base medical and dental care do decrease some types of expenditures by these personnel and their dependents.

3.6.2.2 Goods and Services

In addition to the nearly 300 million payroll dollars it spends each year, Tinker AFB purchases goods and services necessary for operation and maintenance of the base. As shown in Table 3.6.2-C, these expenditures exceeded 460 million dollars in calendar year 1974. Purchases of some types of goods and services tend to be from concerns in the Oklahoma City Metropolitan Area; for example, virtually all payments for utilities and rent, for communications, and for civil engineering projects, go to local firms. Other goods and services--such as equipment, printing, and items for resale by base commercial centers--are purchased partially in the local community and partially elsewhere.

In Table 3.6.2-D are the estimated geographic distribution and amounts of civilian contracts awarded by Tinker AFB during calendar year 1974. As indicated, 6 percent of these contract dollars were awarded to firms in the State of Oklahoma; the estimated dollar volume of contracts awarded in the greater Oklahoma City Area was 35 million, or 5 percent of the total awarded during the year.

Table 3.6.2-C Operating and Maintenance Expenses for Tinker AFB, Calendar Year 1974

Type of Expenditure	Total Amount
Supplies	$ 8,604,704
Equipment	728,106
Travel of Personnel	2,733,766
Transportation of Goods	8,492
Utilities and Rent	643,891
Communications	1,076,200
Overhaul and Maintenance of Equipment	398,937,178
Printing and Reproduction	1,842,355
Civil Engineering Projects and Contracts	2,167,430
Other Contractual Services	14,775,828
Petroleum, Oil and Lubricants	2,383,615
Base Exchange Purchases for Resale	5,907,339
Commissary Purchase for Resale	17,300,201
Recreational Services and Open Messes	5,936,00
	$ 463,045,113

Table 3.6.2-D Geographic Distribution of Direct Civilian Contract Awards of Tinker AFB, Calendar Year 1974

Location	Estimated Total Contract Amount (millions)
Greater Oklahoma City Area	$ 35
Oklahoma Other than Oklahoma City Area	11
TOTAL IN OKLAHOMA	46
Outside Oklahoma	695
	$ 741

4.0 ANALYSIS OF PROBABLE IMPACT OF PROPOSED ACTION

4.1 INTRODUCTION

Preceeding sections of this study have set forth: a description of the proposed action and parameters related to the action that may alter the existing environment; background information including baseline conditions characteristic of Tinker and the metropolitan Oklahoma City area; a discussion of how Tinker presently influences the community in terms of air emissions, noise, accident hazard and in social and economic terms; finally, aircraft operations from Tinker and how they relate to local and regional air traffic.

The following sections analyze the proposed action in terms of how it will cause a change in the natural and human environment as it exists today.

There are many factors that make up the whole of the proposed action, most of which have been presented in Section 2. A further refinement and some repetition is made in the following subsections for clarity and emphasis.

In summary, the proposed action involves the 56-month phase-in of 21 AWACS aircraft beginning in March 1977, and ending in October 1981. Table 2.5.1-A summarizes existing and future flight operational data and information. Table 2.5.5-A summarizes engine runup data which is used in this study to determine, in part, ground generated noise and air pollutant emissions. At the end of the phase-in period there will be a net increase of 774 civilian and military employees over present (4th Qtr, 1975) manpower levels totaling 21,529 personnel. This level of employment does not represent a record high for Tinker AFB.

Therefore, as might be expected, the primary impacts of the AWACS bed-down action are related to aircraft operations in terms of aircraft engine exhaust emissions, noise, accident hazard potential, air traffic and the military construction program.

4.2 AIRCRAFT NOISE AND ACCIDENT POTENTIAL (AICUZ)

4.2.1 NOISE RELATED TO AWACS MISSION

4.2.1.1 Background

The assessment of the noise environment at Tinker AFB due to the aircraft operational activities when the proposed E-3A beddown has been completed in 1981 has been carried out by the Air Force. This assessment is in terms of the AICUZ methodology, and includes noise contours corresponding to L_{dn} = 65, 70, 75 and 80 dB.

The proposed schedules of aircraft operations at Tinker AFB by 1981, including those associated with the AWACS mission have been given in Section 2.5. As noted there, the addition of the E-3A aircraft will result in an increase in the total daily number of flight operations (take offs, go-arounds, and landings) from 211 to 273.5 or approximately a 30% increase in operational activity. The increase in the daily engine runup activity will be approximately 4%. The flight track patterns associated with the E-3A operations, and the proposed utilization rates of each runway and pattern have been given in Sections 2.5 and 3.1.

The operational activities of other aircraft, both assigned and transient, is expected to remain the same as exists currently.

4.2.1.2 E-3A Noise Data

Measurements of the noise levels of the E-3A during its operations have not yet been made. For use in the calculation of noise due to E-3A operations, it has been assumed that the noise data for the E-3A aircraft will be the same as that of the C-141 aircraft. Both the E-3A and C-141 have the same basic engine (TF-33), and the same number of engines, each with the same thrust, approximately 21,000 lbs. This assumes that no additional noise will be generated by the radar dome on the E-3A, nor that the radar dome will affect thrust levels or airspeed (which in turn can affect the perceived noise level) during the aircraft operations of interest.

The basic noise source data for normal takeoff and approach conditions for the C-141 aircraft is shown in Figure 4.2.1-A, in terms of Sound Exposure Level vs. Range.

4.2.1.3 Noise Exposure Contours

The noise contours for the proposed AWACS mission at Tinker Air Force Base are shown in Figure 4.2.1-B. The noise environment defined by the contours is predominantly due to Runway 17-35 operations. Superposition of the flight tracks onto the noise contours, shown on Figure 4.2.1-C, illustrates the relationship of these tracks to the noise contours.

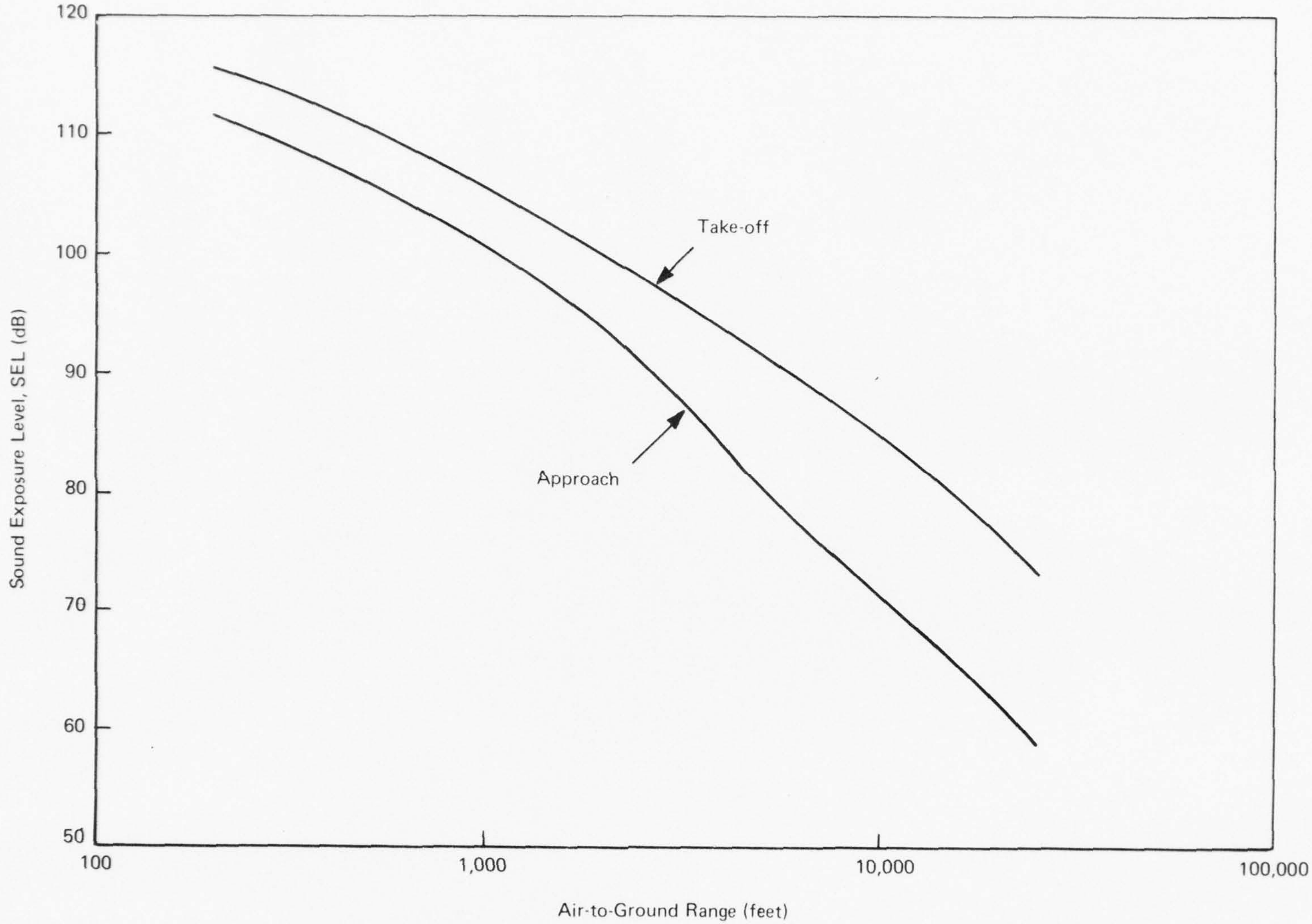
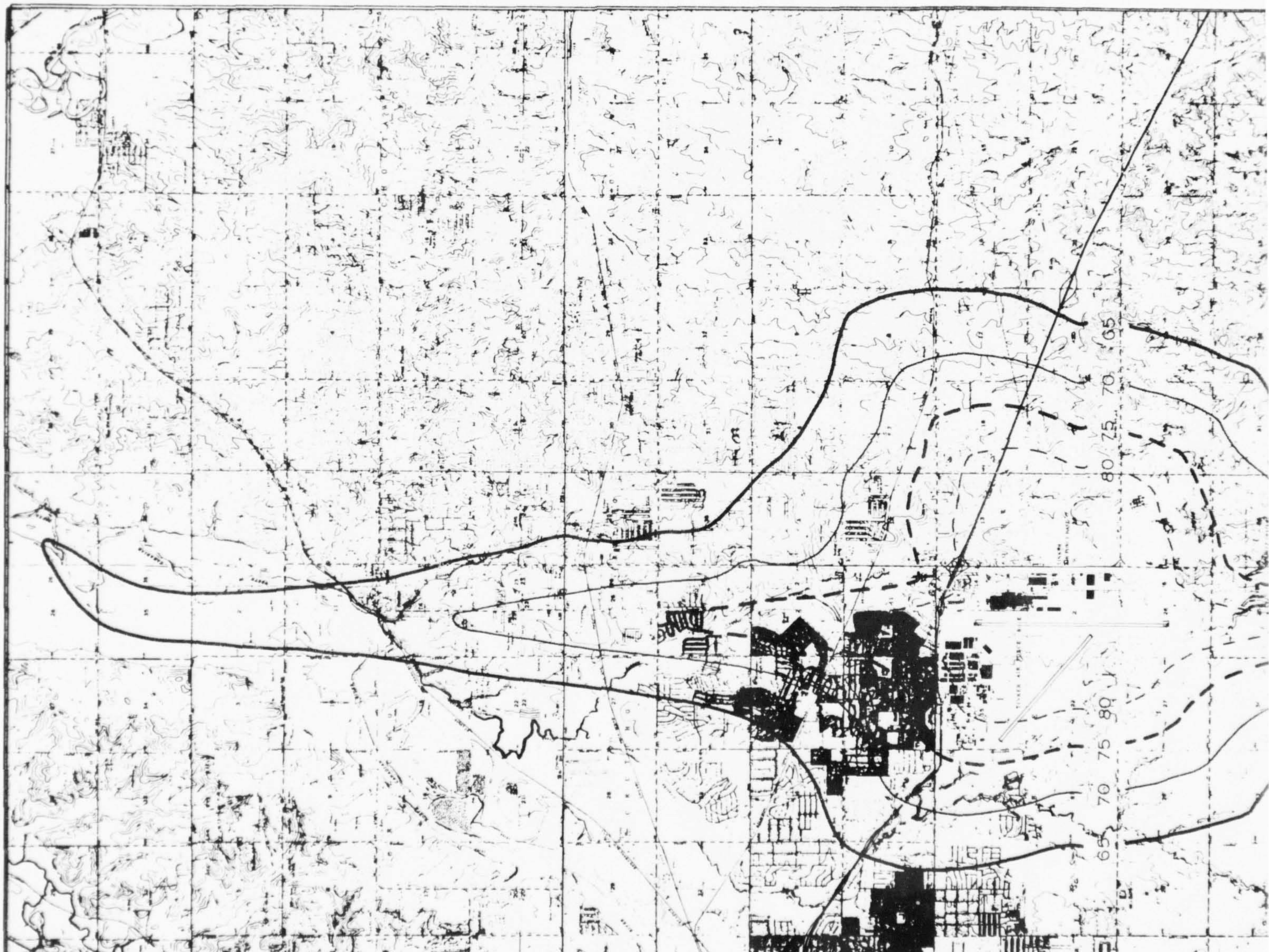


FIGURE 4.2.1-A SOUND EXPOSURE LEVEL VS. RANGE
E-3A AIRCRAFT (Based on C-141 Aircraft Data)



1

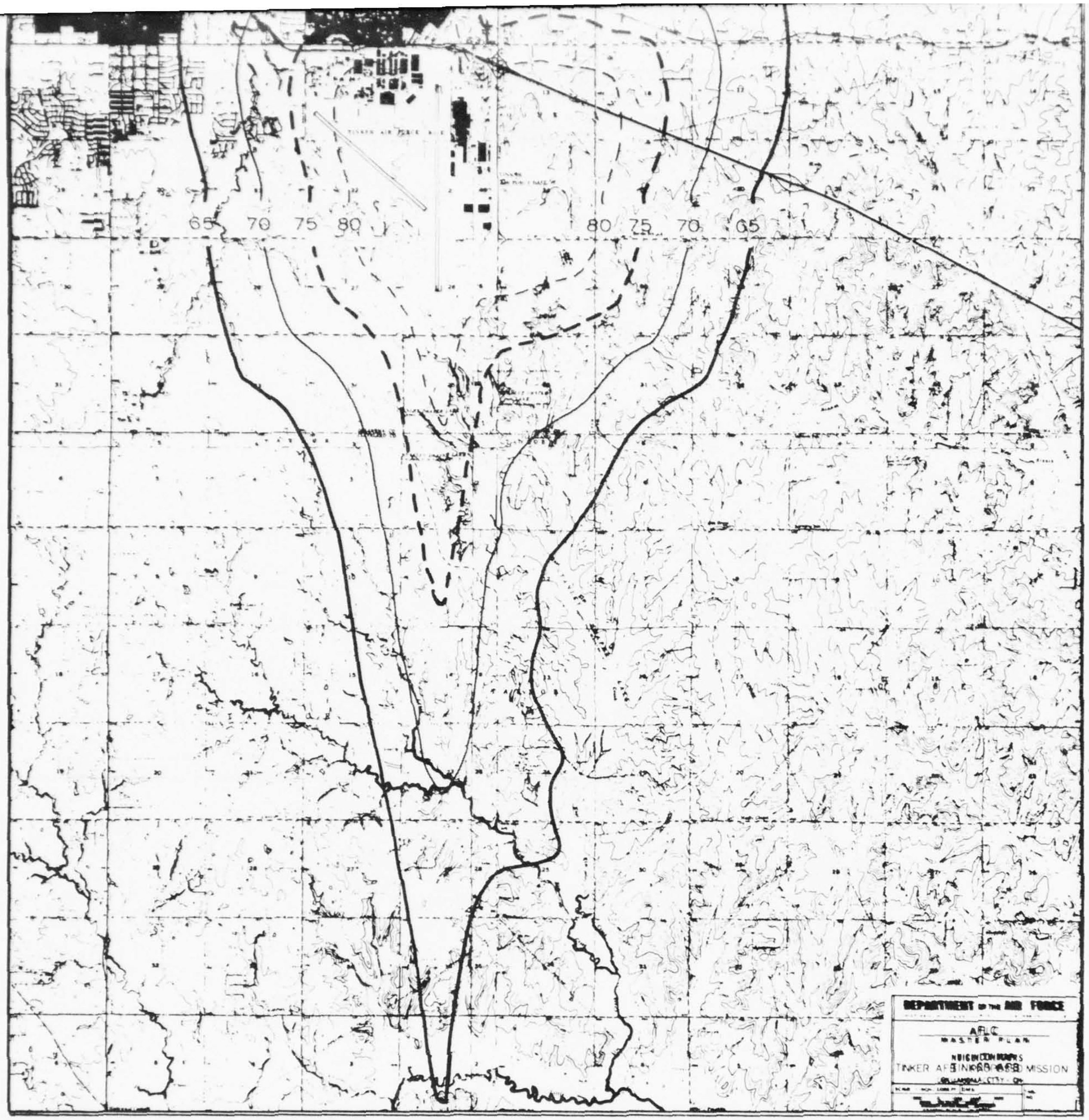
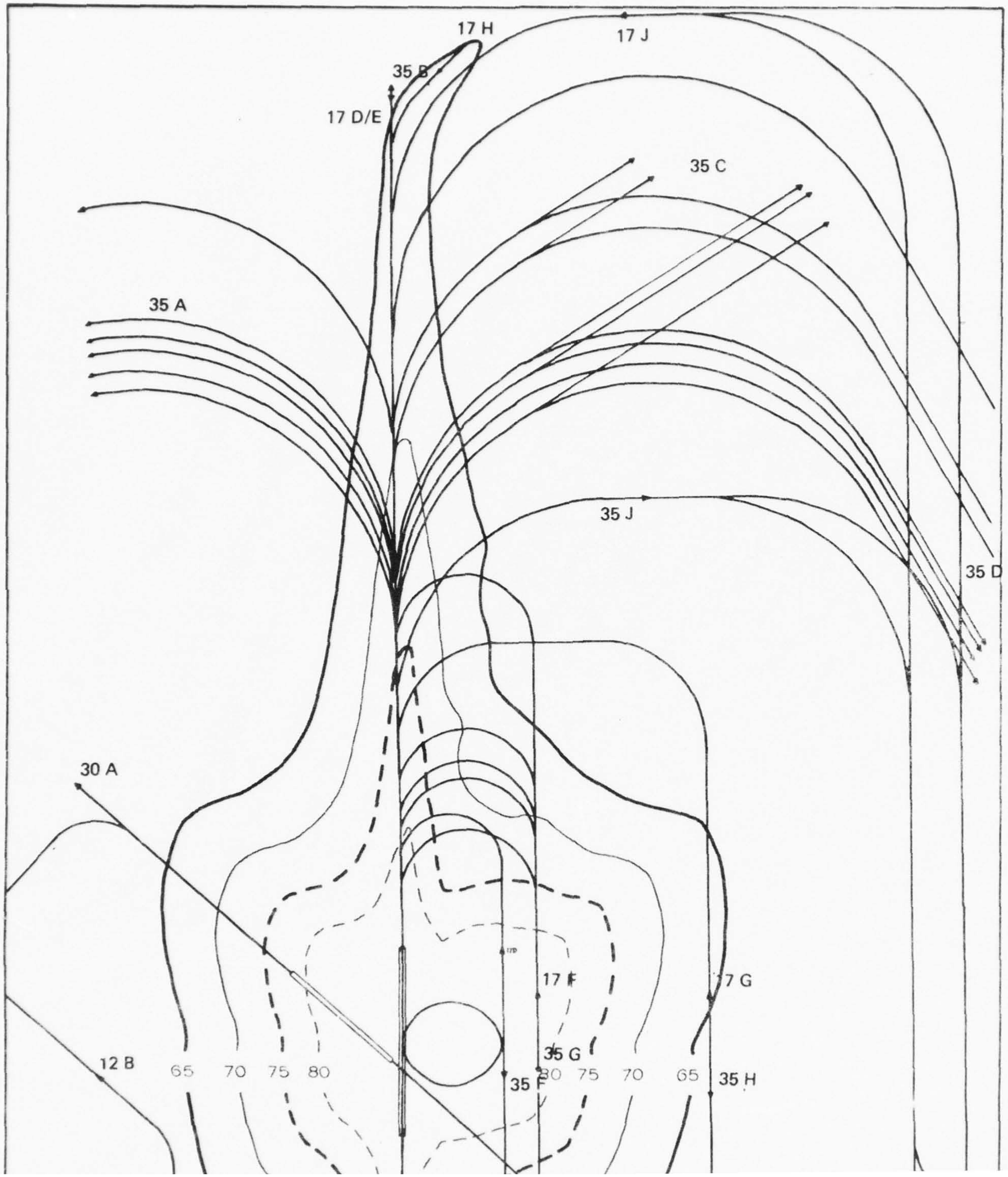


FIGURE 4.2.1–B DAY-NIGHT SOUND LEVEL CONTOURS, TINKER AFB, PROPOSED MISSION, 1981


17 H
17 J
35 B
17 D/E
35 C
35 A
35 J
35 D
30 A
17 F
17 G
12 B
65
70
75
80
35 G
35 F
80
75
70
65
35 H

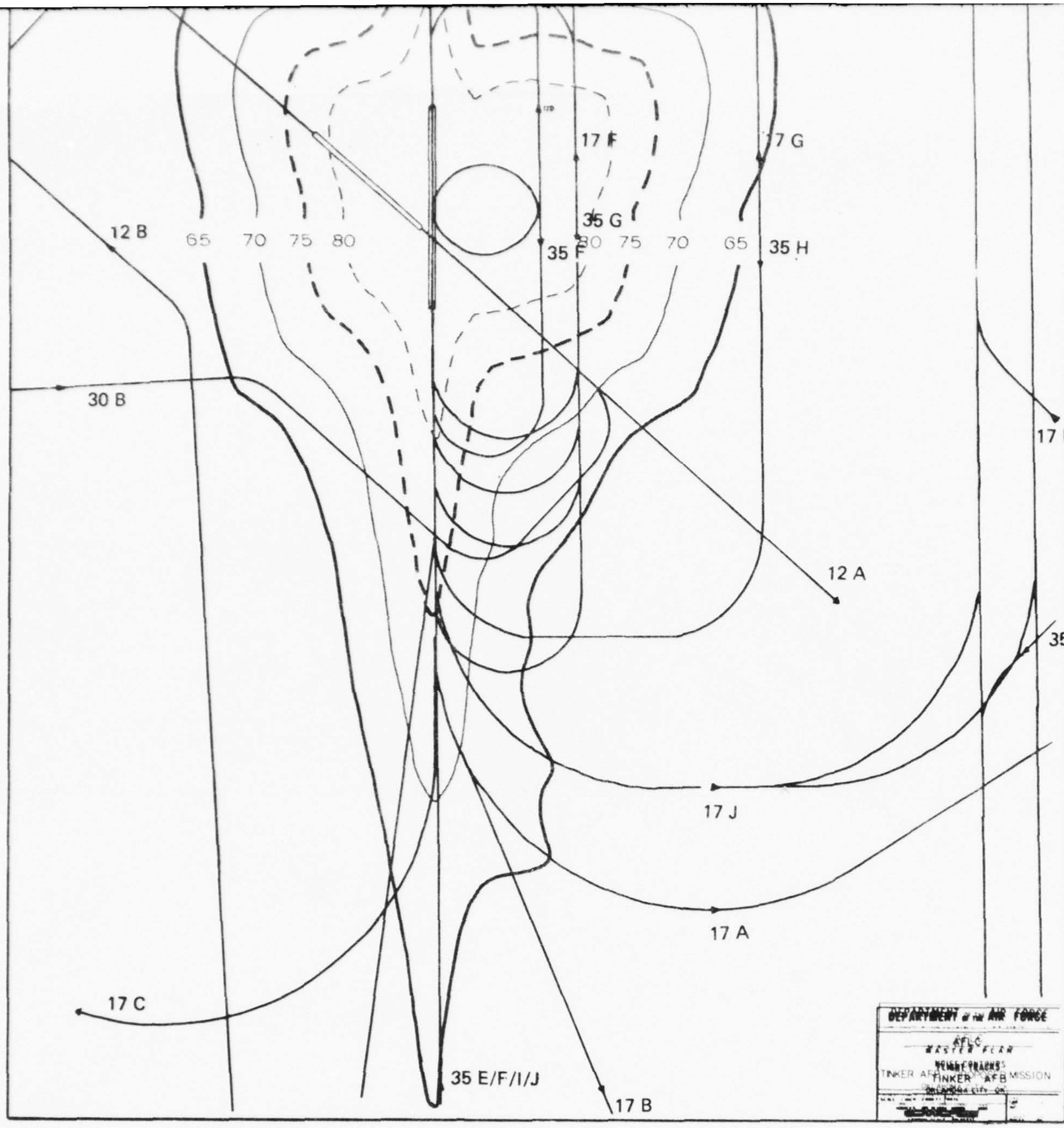


FIGURE 4.2.1–C DAY-NIGHT SOUND LEVEL CONTOURS SUPERIMPOSED ON FLIGHT TRACK PATTERNS, TINKER AFB, PROPOSED MISSION – 1981

The actual change in the noise contours from the present mission to the proposed mission is shown on Figure 4.2.1-D. As indicated, the addition of the AWACS operations will increase the dimensions and enclosed areas of each of the L_{dn} contours by small amounts, reflecting the projected increase in the total number of aircraft operations at Tinker AFB with the completion of the AWACS beddown.

4.2.2 ACCIDENT POTENTIAL ZONES RELATED TO PROPOSED E-3A AIRCRAFT OPERATIONS

The accident potential zones defined by the AICUZ methodology for the proposed AWACS mission at Tinker AFB are the same as those for the present mission, as shown in Figure 3.3.3-D.

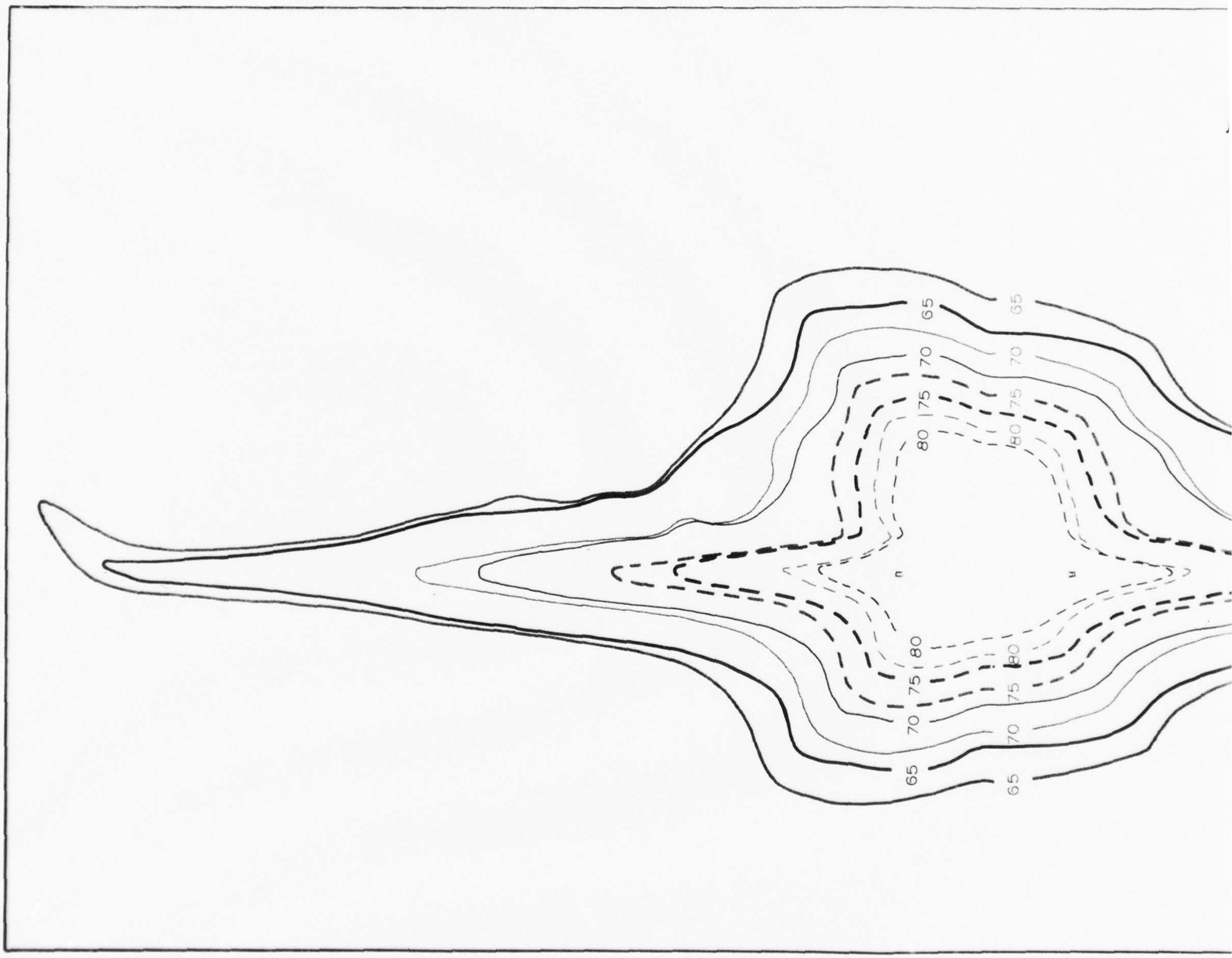
4.2.3 AIRCRAFT NOISE AND ACCIDENT POTENITAL IMPACT

As in the assessment of the impact due to the present mission, the principal measures of the extent of the impact on the surrounding community due to the noise exposure and accident potential are the number of inhabitants, the number of schools and the school population, the number of hospitals, and the number of housing units within each of the AICUZ Compatible Use Districts (CUD). As previously described, the CUD are composites of the Accident Potential Zones, as given on Figure 3.3.3-D, and the noise contours, shown on Figure 4.2.1-B for the proposed AWACS mission at Tinker AFB. A map of the Tinker area showing the CUD zones defined by the superposition for the proposed mission is given in Figure 4.2.3-A.

Estimates of each of these measures have been made for each of the applicable CUD categories* and are given in Table 4.2.3-A. The estimated magnitudes of the change in these measures of impact due to the AWACS mission, as compared to the present mission updated to 1981 time period statistical data, is given in Table 4.2.3-B. Comparison of these tabulated measures of impact with the AICUZ Land Use Compatibility Guidelines, given in Appendix D, indicates that there will be not only a substantial amount of incompatible land use activities at Tinker AFB due to the AWACS mission but also a significant increase in such activities due to the mission change.

Two schools, the East Side and Steed Elementary, will be within incompatible zones. This represents an increase of one over the present mission. Twenty other schools (an increase of three), three hospitals, and one nursing home will be located within CUD's for which compatibility is conditional on particular levels of noise reduction achieved by the building structure. Residences in CUD's defined by L_{dn} 75 or greater are considered incompatible by the Guidelines; according to the tabulations, an estimated total of 11,711 inhabitants and 3464 housing units are within the L_{dn} 75 contour. These

* Note that CUD categories 1, 4, 5, 8, and 11 do not apply to the proposed AWACS mission at Tinker Air Force Base.



1

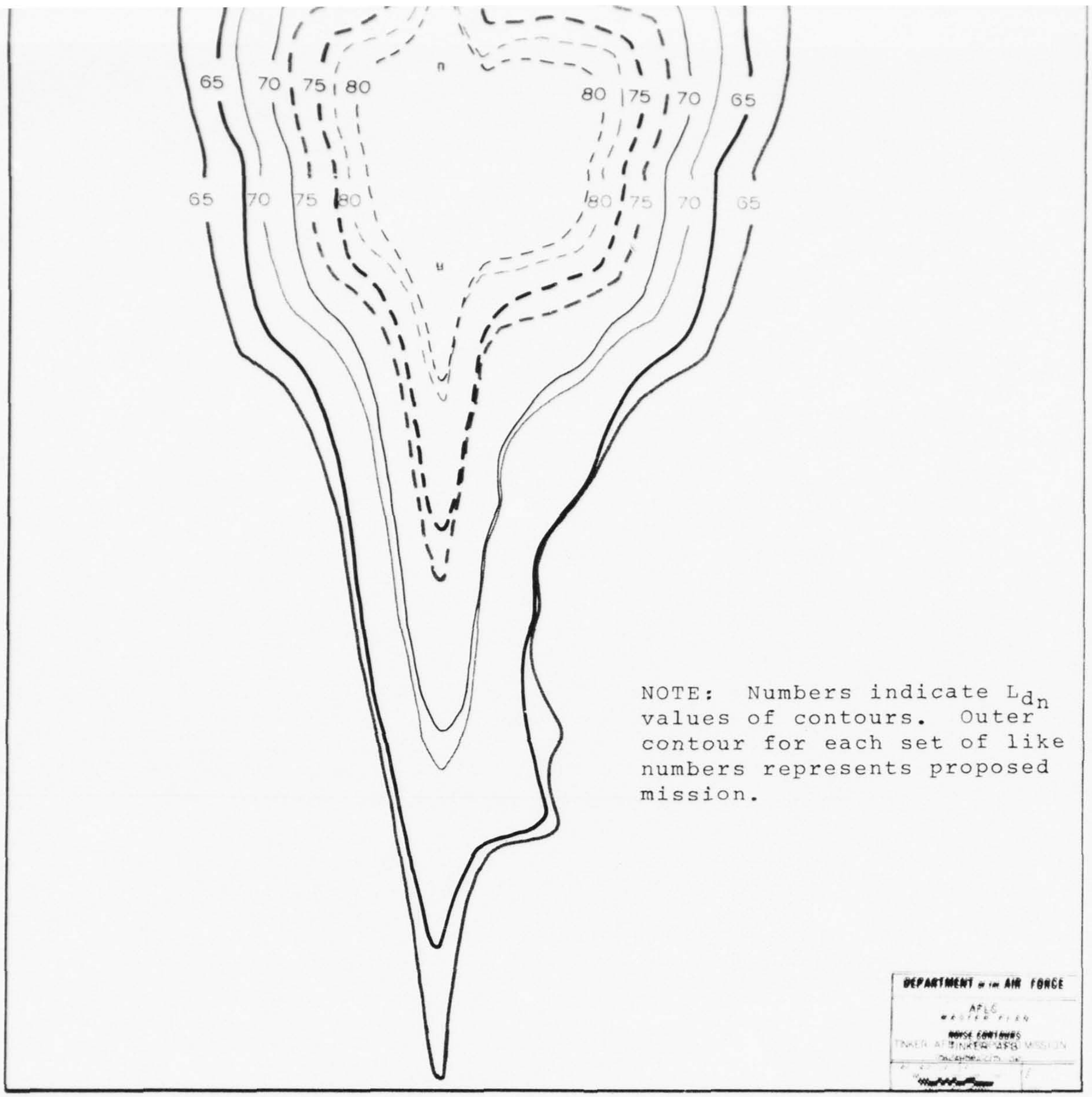
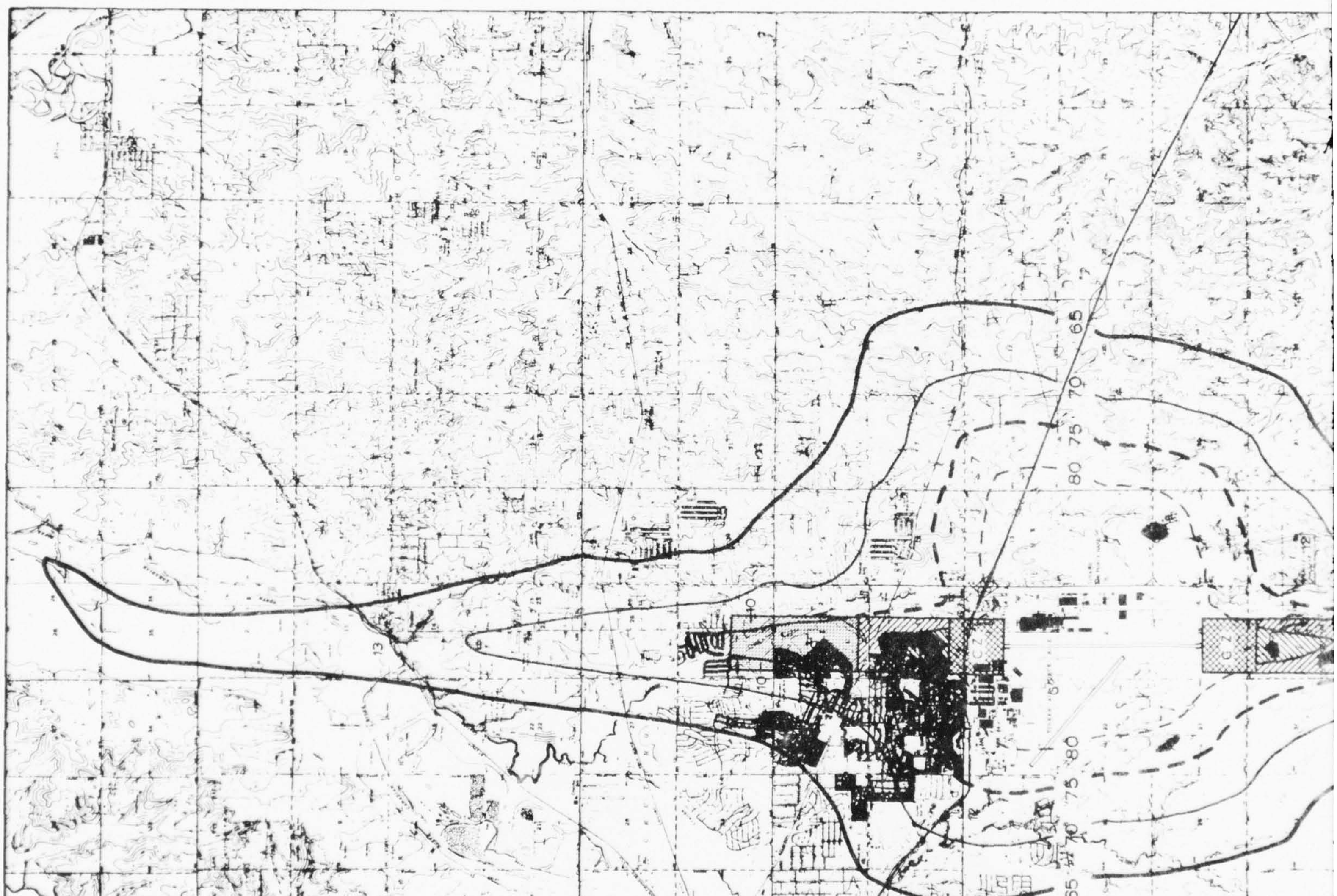


FIGURE 4.2.1–D DAY-NIGHT SOUND LEVEL CONTOURS, COMPARISON OF PRESENT AND PROPOSED MISSIONS, TINKER AFB



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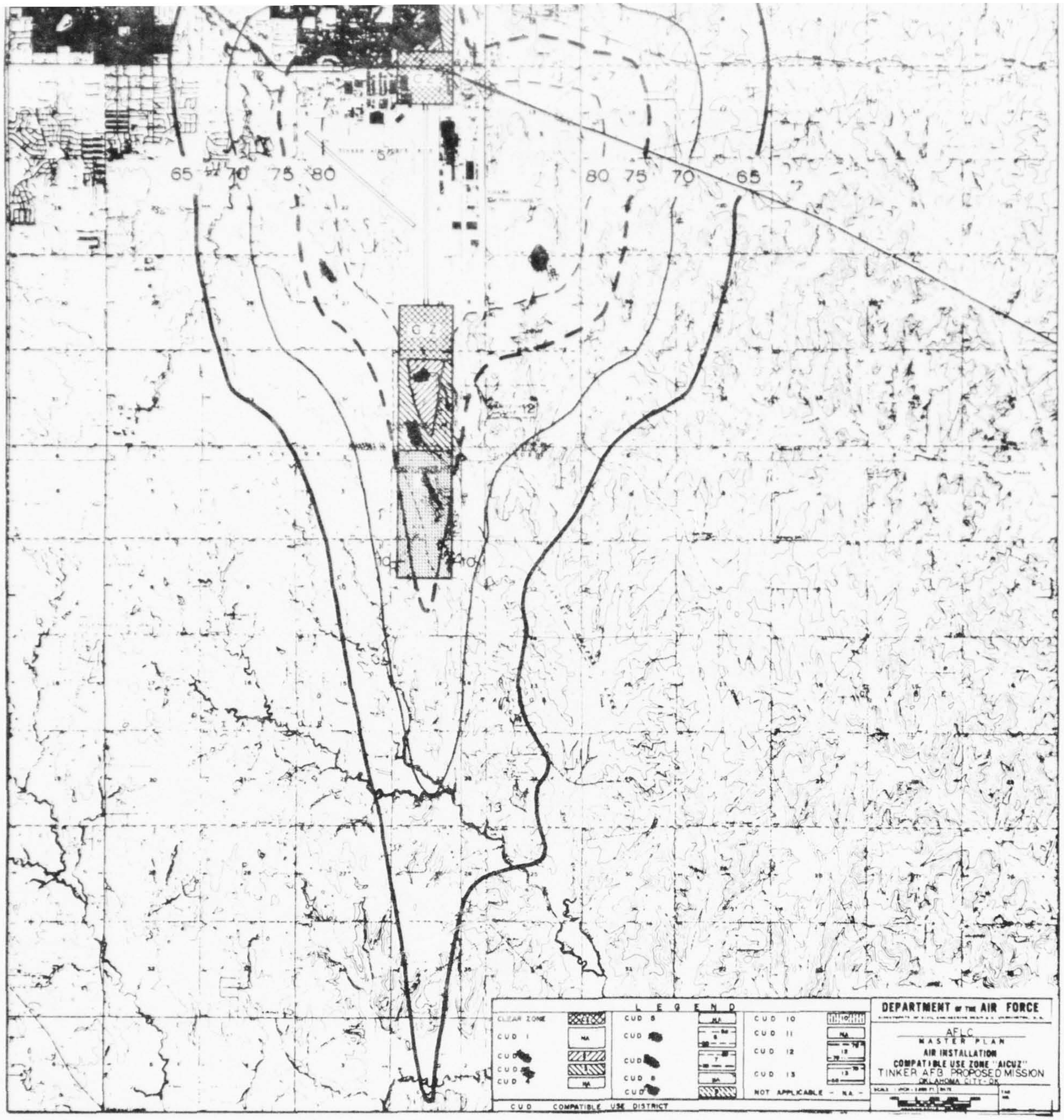


FIGURE 4.2.3–A AICUZ MAP FOR PROPOSED MISSION – 1981, TINKER AFB

2

Table 4.2.3-A

AICUZ Impact - Proposed AWACS Mission at Tinker AFB - 1981 Time Period Statistics

Compatible Use District (CUD)

Impact Measure	2 Ldn 80-85 APZ I	3 Ldn 75-80 APZ I	6 Ldn 80-85	7 Ldn 75-80	9 Ldn 75-80 APZ II	10 Ldn 70-75 APZ II	12 Ldn 70-75	13 Ldn 65-70
Inhabitants	0	0	991	7811	2909	1621	23,337	24,923
Schools	0	0	0	1*	1**	0	9***	11 ****
Students	0	0	0	648	500	0	8177	18,239
Hospitals	0	0	0	0	0	0	2 †	2††
Housing Units	0	0	301	2305	858	462	6499	8109

* East Side School

** Steed Elementary School

*** West Side Elementary, Carl Albert Junior and Senior High, Star Spencer High, Soldier Creek, Barnes Elementary, Jarman Jr. High, Willowbrook, Monroney Jr. High Schools

**** Sooner-Rose Elementary, Oscar Rose Junior College, Traub Elementary, Country Estates, Rogers Middle, Kerr Jr. High, Ridgecrest, MidWest City High, Vocational Tech., Tinker, Star Schools

† Coyne Campbell Hospital, Four Seasons Nursing Home

†† Tinker, Midwest City Memorial Hospitals

Table 4.2.3-B

AICUZ Impact - Quantity (Percent) Increases

Comparison of Proposed AWACS Mission and Present Mission at Tinker AFB

(Both Missions Based on 1981 Time Period Statistics)

Compatible Use District (CUD)

	6	7	9	10	12	13
Impact Measure	Ldn 80-85	Ldn 75-80	Ldn 75-80 APZ II	Ldn 70-75 APZ II	Ldn 70-75	Ldn 65-70
Inhabitants	+90 (10)	+5999 (330)	1145 (65)	-1251 (-43)	7785 (50)	-1981 (-7)
Schools	-	1 (*)	-	-	+1 (13)	+2 (22)
Students	-	648 (*)	-	-	2731 (50)	-315 (-2)
Hospitals	-	-	-	-	+2 (*)	-2 (-50)
Housing Units	+35 (13)	1674 (265)	333 (63)	- 362 (-44)	2068 (47)	+30 (<1)

Note: No changes in CUD 2 or 3

* Increased from zero

values represent increases of 7234 inhabitants and 2042 housing units over the present mission when estimates for both missions are based on 1981 time-period projections.

4.2.4 LAND USE WITHIN AIRCRAFT NOISE AND ACCIDENT POTENTIAL AREAS

One of the major potenital impacts of the AWACS mission at Tinker AFB on land use is the change in the total area subjected to adverse noise exposure from aircraft operations. This will not of itself have an immediate or perceptible influence on land use but its immediate impact will be perceived by the population living and working in the exposed area. Long-range impact on land use may occur as noise emanating from operations at Tinker AFB influences future zoning and development trends in affected areas. Possible consequences of such an influence include restrictive zoning on the basis of the AICUZ guidelines or lessened attractiveness of exposed areas for certain types of development. The land areas within the noise exposure contours and the AICUZ Compatible Use Districts (CUD) under the proposed mission are shown in Figure 4.2.1-B.

In order to quantify the impact on land use due to the changes resulting from the proposed mission, the noise and accident contours for the proposed mission have been superimposed on the long-range plan-1985 of Midwest City as shown in Figure 4.2.4-A. This map reflects the official policies for the development of Midwest City and its environs as set forth by the Midwest City Planning Department. It is intended that these policies be implemented through the use of Subdivision Regulations, Comprehensive Zoning Ordinance, Major Streets and Highways Plan, Building Code, Housing Code and other regulations [30]. The indication of an area for residential use, for example, does not mean that such development is imminent or inevitable. However, the area is subject to the designated land use and may be so developed at some point in the future--presumably by 1985.

As the source of land use data is from the long-range land use map (1985) and from the generalized land use map of Midwest City and from the existing land use map and the comprehensive land use plan of Del City, the quantitative data presented in the following discussion is again only intended to represent an approximation of the incompatible land use that may result in the future due to the proposed mission.

Under the proposed mission, 43% (8033 acres) of Midwest City will be exposed, assuming land use develops as projected through 1985. This represents an increase of 15% (1048) over the present mission. Additionally, 312 acres of Del City will be exposed. Under the present mission, Del City does not fall within the AICUZ. A somewhat greater area of Spencer is also exposed under the proposed mission. The land use in approximate acreage within the eight CUD's under the proposed mission for Midwest City is given in Table 4.2.4-A and within CUD 13 under the proposed mission for Del City in Table 4.2.4-B. In both tables, land use within CUD's was based on the long-range plans for the two cities (16,69) and thus reflects the planned development of the areas.

N.E. 36th
SPENCER
N.E. 23rd
N.E. 10th
E. Reno
S.E. 15th
Sooner
Air Depot
Midwest
Douglas
Post
Westminster
N. Canadian R.
Levee
Levee
S.L.&S.F. R.R.
SOLDIER
CREEK
CRUTCHO
CREEK
CREEK
10
10
9
3
2
13
12
65
70
75

1

FIGURE 4.2.4-A LAND USE PLAN, 1985 – MIDWEST CITY, OKLAHOMA PROPOSED MISSION

Table 4.2.4-A

Land Use in AICUZ Areas in Midwest City, Oklahoma* - Proposed Mission, Tinker AFB and Land Use as Indicated in the Long Range Plan - 1985

Land Use Classification	CUD Zone 2	3	6	7	9	10	12	13
Residential Single and Multi-Family	0	0	0	490	201	96	2080	2770
Commercial	0	8	7	65	0	0	209	159
Industrial and Public Utilities	0	136	5	87	8	0	85	235
Open Schools, Parks Public Land	110	94	72	60	155	35	454	412
Total	110	238	84	702	364	131	2828	3576

Total Acreage Exposed: 8033
Total Acreage, Midwest City: 18,560
% Acreage Exposed: 43%

Table 4.2.4-B

Land Use in AICUZ Areas in Del City, Oklahoma - Proposed Mission, Tinker AFB, and Land Use as Indicated in the Del City Comprehensive Plan

Approximate Acreage in CUD 13[1]	
Land Use	
Residential	174
Single and Multi-family	
Commercial	40
Industrial and Public Utilities	0
Open	98
Schools, Parks, Public Land	
TOTAL	312

1 Acreage based on land use as depicted in the Comprehensive Plan, Del City Planning Department, December 9, 1974.

Land use in the areas to the south and east of Tinker AFB should remain relatively undeveloped as discussed in Section 3.3.3.5. Yet, within the area of Midwest City, Del City, and Spencer, development is expected to continue, resulting in an increase in the amount of incompatible land use and conditionally land use, as defined by the AICUZ guidelines in Appendix D. The change in mission and the unrelated projected development will increase incompatible land uses in exposed areas.

Table 4.2.4-C is the estimated change in affected acreage in Midwest City from the present mission to the proposed mission for the eight CUD zones, utilizing acreage figures under the long range plan - 1985. This table reflects two changes over the present situation: first, an increase in the area exposed to the proposed new mission noise and accident contours and second, an increase in development with an accompanying decrease in open or vacant land. The latter is projected to occur regardless of AWACS. Incompatible land use will increase due to these two factors. To determine if a given land use is compatible or conditionally compatible, as defined by the AICUZ methodology (Appendix D), under the proposed mission, a comparison should be made between the CUD zone, as located on Figure 4.2.4-A and the land use under consideration. For example, residential land use is considered incompatible within CUD's 2, 3, 6, 7 and 9.

Table 4.2.4-D shows the amount of incompatible land use and conditionally compatible land use that may occur in Midwest City and Del City under the AWACS mission. Under the proposed mission, approximately 706 acres of incompatible land use may exist, an increase of 350% (549 acres) over the development in CUD 7 and 9. In addition, approxomately 5715 acres will be considered conditionally compatible use only.

Table 4.2.4-C

Land Use in AICUZ Areas in Midwest City,
Estimated Change from Present Mission to Proposed Mission, Tinker AFB

Change Within CUD Zones Approximate Acreage (Percent)[1]

	2	3	6	7	9	10	12	13
Residential Single and Multi-Family	0	-5 (-100)	0	+415 (533)	+128 (175)	+26 (37)	+1355 (187)	+1760 (174)
Commercial	0	+8 ( )[2]	+3 (75)	+30 (86)	0	0	+128 (158)	+29 (22)
Industrial and Public Utilities	0	+126 (92)	0	+84 (2800)	+3 (60)	0	+75 (750)	+215 (1075)
Open Schools, Parks, Public Land	+74 (205)	-203 (68)	-3 (4)	+41 (216)	+26 (20)	-182 (-84)	-1116 (-71)	-1968 (-83)
Total	+74 (205)	-74 (-24)	0	+570 (431)	+157 (75)	-157 (-55)	+442 (185)	+36 (1)

1 Acreage within AICUZ for proposed mission and 1985 land use plan compared with acreage within AICUZ for the present mission and the most recent (1968) land use survey of Midwest City. Thus, the figures represent both the proposed mission change at Tinker AFB and the planned development of the area as depicted in the long-range plan.

2 Increase from zero

Table 4.2.4-D

Incompatible Land Use in Midwest City and Del City Under AICUZ[1] for Proposed Mission at Tinker AFB

Land Use Classification	Approximate Incompatible Acreage in CUD								
	2	3	6	7	9	10	12	13	Total
Residential Single and Multi-family	---	---	---	490	201	(96)[1]	(2080)	(2944)	691 (5120)
Commercial	---	8	7	(65)	---	---	(209)	---	15 (274)
Industrial and Public Utilities	---	(136)[2]	(5)	(87)	(8)	---	(85)	---	(321)
Open School, Parks, Public Land	---	---	---	---	---	---	---	---	-----
Total	---	8	7	490	201	---	---	---	706 (5715)

1 As defined by AICUZ Land Use Compatibility Guidelines (Appendix D).

2 ( ) conditionally acceptable land use as defined by AICUZ.

4.2.5 NOISE IMPACT DURING PHASE-IN OF AWACS AIRCRAFT

The evaluation of the noise impact at Tinker AFB has been based on calculations of the noise exposure due to the present (1975) mission and to the proposed (1981) AWACS mission at such time as the E-3A beddown of 21 aircraft has been completed. During the interim period during which the E-3A aircraft will be phased-in to Tinker AFB operations, the noise impact would generally be expected to be at some intermediate level, between those levels associated with the present and the proposed missions.

4.2.6 SONIC BOOMS

Since the E-3A aircraft is not capable of supersonic flight, there will be no change in the frequency of sonic booms in the Oklahoma City environs. As noted in Section 3.3.3.6, sonic booms may occur only under emergency conditions or in cases of certain military exercises, in accordance with Air Force Regulation 50-34, reproduced in Appendix E.

4.2.7 ACCIDENT POTENTIAL OF E-3A

The AWACS, officially designated E-3A, is new to the U.S. Air Force inventory, and therefore has accumulated only a limited amount of flight time, during which there have been no significant accidents involving this aircraft.

The E-3A includes a current production high performance jet aircraft, the Boeing 707-320, and an externally-mounted rotodome assembly. The airframe is similar to the C-135; while the aircraft engines to be used are similar to those used in the C-141. Accident rates for each of these aircraft are given in Table 4.2.7-A. These comparisons provide some indication of the accident potential of the E-3A in terms of the record of the basic airframe and engine type to be used. Also given in this table is a summary of currently available accident statistics for all operations of U.S. certified route and supplemental air carriers [72].

Table 4.2.7-A

Accident* Rate Per 100,000 Aircraft-Hours Flown

	Military		Commercial
Year	C-135	C-141	All U. S. Air Carriers
1969	1.2	0.0	0.9
1970	0.3	0.2	0.9
1971	0.5	0.2	0.8
1972	0.7	0.0	0.8
1973	0.9	0.6	0.6
1974**	0.5	0.5	-

* An aircraft accident in commercial operations is defined as "an occurrence associated with the operation of an aircraft which takes place between the time any person boards the aircraft with the intention of flight until such time all such persons have disembarked, in which any person suffers death or serious injury as a result of being in or upon the aircraft or by direct contact with the aircraft or anything attached thereto, or the aircraft receives substantial damages". A survey of civil air carrier accidents indicates that approximately one-half of the total reported accidents were from injuries due to turbulence or ramp accidents, with no accompanying damage to the aircraft.

An aircraft accident in military operations is defined as one of which more than 150 man-hours are required to repair the aircraft, or one in which death or serious injury results.

** January through September.

4.3 AIR TRAFFIC

4.3.1 INTRODUCTION

A gradual buildup of operational activity will begin with the scheduled receipt of the first AWACS aircraft in November 1976. Additional aircraft are scheduled to arrive at a rate of one per two months. The level of operational activity of the AWACS aircraft is dependent upon aircraft and equipment check out, maintenance crew, air reserve and air crew training schedules. Aircraft operational data given in Table 2.5.1-A from which tower events are calculated, are based on the highest level of operational activity achieved through the maximum number of AWACS aircraft operating continuously at Tinker AFB, and concentration of the mission on Phase I Training. This is, in effect, a worst case assumption.

4.3.2 LOCAL TRAFFIC

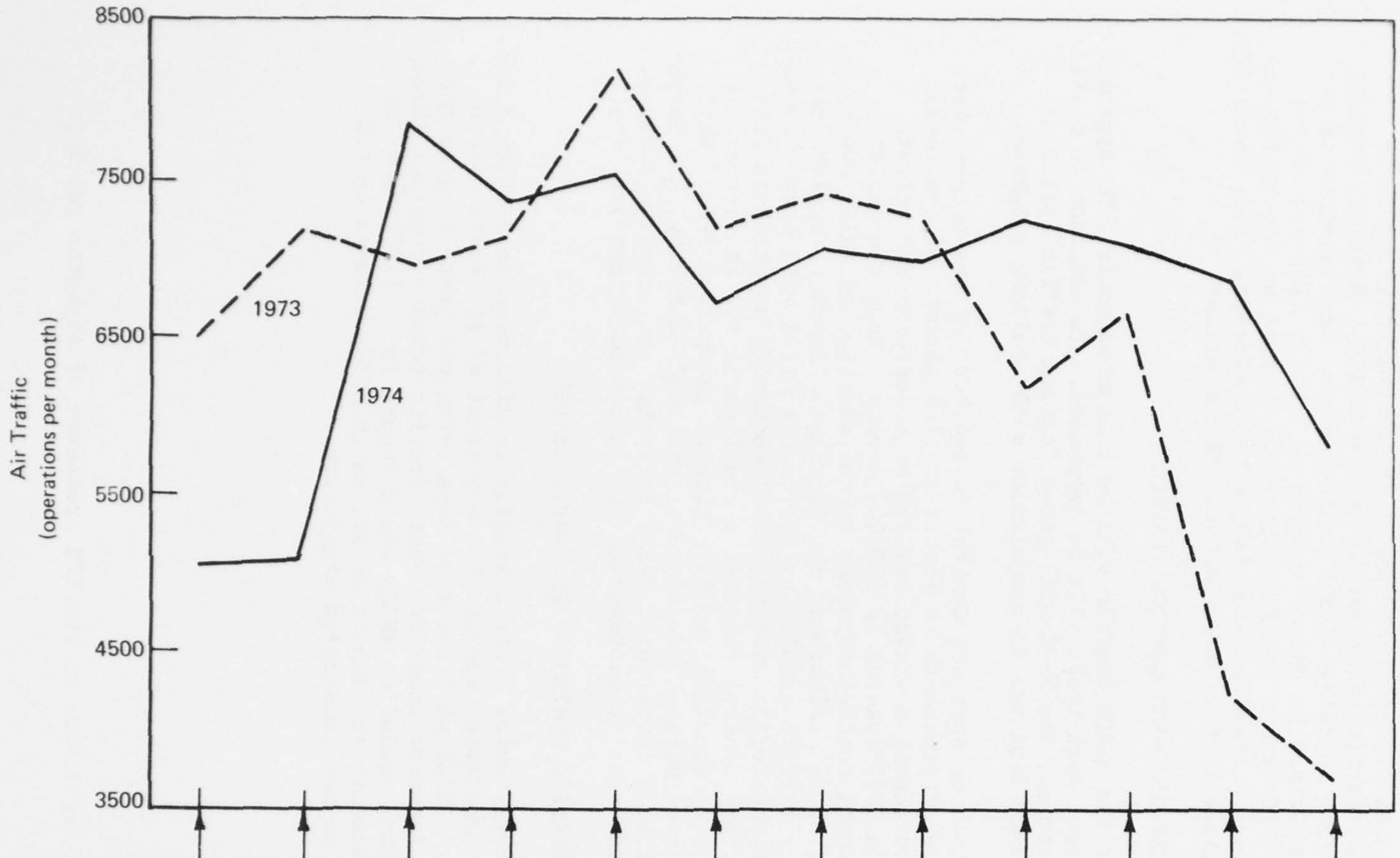
Under the assumption made above, the greatest traffic impact will occur at the local level. The percentage increase is tabulated below:

	Events Per Day - Day/Night (0701-2201-0700)			
	1974	AWACS	1981	% Increse (Net)
Departures	85.1/.32	7.8/.03	92.9/.35	+9.2/+9.3
Arrivals	85.1/.32	7.8/.03	92.9/.35	+9.2/+9.3
Go-Arounds	47.3/.17	46.9/.18	94.2/.35	99/105
Totals	217.5/.81	62.5/.24	280.0/1.05	28.7/29.6

As pointed out earlier in Section 3, there is a current preponderance of VFR arrivals at Tinker AFB (56.9 percent of all arrivals). To a certain extent, VFR approaches are less annoying than IFR approaches (see Section 3.1.3.5). With the advent of AWACS at Tinker AFB, the number of IFR approaches will be increased as follows:

Events Per Day - Day/Night (0701-2200/2201-0700)			
1974	AWACS	1981	% Change (Net)
36.5/.24	55.0/.12	91.5/.36	151/50

Figure 4.3.2-A displays the control tower traffic on a monthly basis for 1973 and 1974. The greatest traffic loading occurred in May of 1973, when 8,238 events were recorded. The 0701 to 2200 traffic loading for AWACS is projected to be 62.5 per day. The May 1973 tower loading is 380.21 per day (based on a 260 day year). For the 15-hour day the projected hourly loading is 442/15 or 29.5 for the 1978 time frame, in other words one event every 2.03 minutes for 15 hours. Given this situation one would



Month	Jan	Feb	March	April	May	June	July	August	Sept	Oct	Nov	Dec
1974	5044	5133	7630	7395	7538	6719	7078	6983	7320	7125	6796	5717
1973	6449	7236	6961	7142	8238	7152	7432	7253	6220	6568	4430	3568

FIGURE 4.3.2–A TINKER CONTROL TOWER TRAFFIC, 1973 AND 1974

expect a modest number of departure delays and/or holdings* prior to obtaining clearance, particularly during peak activity. However, current traffic is not subject to delays (25.3 events/hour). This anomaly is at least partially explained by the definition of a delay (FAA definition of a delay is time in excess of 15 minutes) and in part by the resilience of Air Training Command traffic which favors VFR conditions, and, therefore, does not add to Tinker traffic under actual IFR conditions.

4.3.3 OKLAHOMA CITY APPROACH CONTROL TRAFFIC

Since a portion of the AWACS traffic will be conducted under IFR, Approach and Departure Control Work Loads will be increased. In addition to normal arrivals and departures, the E-3A will shoot "closed traffic" patterns and make touch-and-go landings in conjunction with training programs.

The current work load of Approach Control is 144,000 IFR events per year. Of this 56,550 are attributable to Tinker or 39.3 percent of the total. Approach Control forecasts a steady buildup of commercial and private traffic so that the 1977 loading is 190,000 events. Thus the direct impact on the approach control forecast is the addition of AWACS events (16,260 per year), or an 11.2 percent net increase. However, by 1981 the percentage military traffic handled by approach control will have decreased to 38.3 percent of the total. The personnel contacted at Oklahoma City Approach and Departure Control forecast a requirement for an increase in cab manning from three (current) to five through the period FY77. While this forecast was made without knowledge of the AWACS activity, Mr. Murphy (chief controller) when informed of AWACS felt that the existing forecast manning would be adequate to accommodate the increased Tinker activity.

4.3.4 AIR ROUTE TRAFFIC CONTROL - FT. WORTH CENTER

The current Ft. Worth Center traffic loading is discussed in Section 3.1.2. The 22,126 Tinker departures represent 4.4 percent of Ft. Worth's total departure traffic. AWACS will add 2033 departures per year bringing the total to 24.159. Assuming other Ft. Worth traffic remains constant through 1981, the new loading including AWACS would amount to 24,159/502,669 or 4.8 percent. In summary the impact on Ft. Worth ARTCC amounts to 0.4 percent, and this is not considered significant.

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* The term holding refers to the IFR procedure of airborne waiting.

4.4 NOISE DUE TO CHANGES IN VEHICULAR TRAFFIC

In Section 3.3.4 it was established that automibile traffic noise during commuting time was the only significant off-base noise that was specifically related to the day-to-day operations at Tinker. The worst case assumption is that the net increase of 774 personnel will result in 774 more vehicles being added to the total commuting traffic of approximately 19,000 vehicles (Reference 27, page 37, Table XIV). This traffic increase of 10 percent will not produce any detectable increase in the level of traffic noise. Hence, there is no related incremental noise impact.

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4.5 AIR QUALITY

4.5.1 TINKER AFB EMISSIONS-1981

Section 3.3.2 presented an emission inventory of Tinker AFB as of 1974. This section will deal with the projected changes in that inventory as a result of the AWACS beddown to be completed in October 1981. In the study of these changes, only those that are directly the result of the beddown have been included, e.g., increased fuel storage tank working losses associated with an AWACS-related increased fuel throughput or those that are inevitable, such as the decrease in some vehicular emission indices due to improved emission controls. Changes resulting from other projects unrelated to AWACS that are still in the planning stages or under construction have not been included.

Tables A-1 through A-5 (Appendix A) present a summary of the emission sources for each of the five pollutants for 1981. Percentage changes in emissions resulting from the projected arrival of 21 E-3A aircraft at Tinker are shown.

The AWACS aircraft will fly an estimated 2033 sorties per year. This increased activity gives rise to increases in other sources as presented in the tables. Testing of the AWACS' engine on run-up stands will increase emissions from this source. The AWACS will increase overall fuel consumption, thus increasing the storage tank, refueling, and spillage emissions. Emissions from the AGE associated with this aircraft will increase the AGE emissions over those of 1974.

Not every source will have increased its emissions, however. Some vehicular emissions will decrease. The number of personnel at Tinker AFB in 1981 will be only slightly greater than the number of people presently on the base. Therefore, it is projected that there will be only a slight increase in the number of vehicle miles driven on base. The newer cars with improved emission controls then in service will have replaced some of the cars currently in use, and this will result in an actual reduction of hydrocarbon, carbon monoxide, and nitrogen oxide emissions from this source despite the greater number of miles driven on base.

The anticipated distribution of emission sources within the grid zones on the base map in Figure 3.3.2-A is presented in Tables A-1 through A-5 (Appendix A). The emission densities that are expected to exist within these grid zones in 1981 are listed in Table 4.5.1-A.

Table 4.5.1-A

Projected Emission Densities for Tinker AFB

in 1981 and Comparison with 1974

		1974					(10^3 kg/km^2-yr) 1981					Percent Change				
Grid*	Area Km^2	CO	HC	NOx	Part.	SOx	CO	HC	NOx	Part.	SOx	CO	HC	NOx	Part.	SOx
A	1.95	70	110	57	4.5	22	33	100	54	4.5	22	-54	-2	-5	+2	0
B	.43	71	74	54	4.0	12	32	71	51	4.1	12	-54	-4	-6	+1	0
C	1.24	300	370	350	30	40	260	360	340	30	40	-13	-1	-1	0	0
D	34	69	11	22	1.8	5.5	30	5.6	19	1.8	5.5	-56	-50	-13	0	0
E	1.45	68	11	24	1.9	4.2	30	5.0	21	1.9	4.2	-56	-53	-12	+2	0
South 40	1.48	68	11	14	1.1	0.7	30	5.2	11	1.2	0.7	-56	-51	-22	+3	+1
F	5.22	110	92	22	5.4	1.2	190	170	30	9.7	2.3	+66	+81	+35	+80	+95
Overall	17.0	81	71	44	4.8	6.6	88	92	45	6.1	6.9	+9	+30	+2	+28	+5

*Keyed to Emission Density Map, Figure 3.3.2-A

4.5.2 AIR QUALITY IMPACT OF TINKER AFB-1981

The impact of current operations at Tinker AFB on regional and local air quality was discussed in Section 3.3.2.4. The changes in emissions from base operations that are anticipated by 1981, as described in the previous section, are indicative of the changes in air quality impact of these operations.

The anticipated contributions of Tinker AFB to total emissions in the Central Oklahoma Region are listed in Table 4.5.2-A. As shown in the table, the total contribution by the base to regional emissions is expected to remain generally in the 0 to 3 percent range for all pollutant classes. As shown in the bottom line of the table, the changes in base operations are expected to result in increases of regional emissions ranging from 0.1 percent for CO to 0.5 percent for HC. Some significance must be attached to the increases in HC and particulate emissions because of the excessive concentrations of photochemical oxidants* and particulates that exist in the Region at the present time. The increases in HC and particulate emissions can be expected to impede to some degree efforts to control concentrations of these pollutants in the Region. The increases in emission of the other pollutant classes are not of concern since these pollutants are not present in excessive concentrations in the Region.

The local impact of future operations at Tinker AFB is indicated in Table 4.5.2-B by a comparison of emission densities anticipated at the base with current emission densities in the environs. As shown in the table, densities of CO, NOx, and particulate emissions are expected to remain in the general ranges of emission densities that presently exist in the central and intermediate zones of the Region. Since excessive concentrations of particulates are observed currently in other parts of the Region, there appears to be a strong likelihood of excessive particulate concentrations developing at the base with the introduction of AWACS.

The emission density comparison also indicates the development of relatively high densities of HC and SOx emissions at the base. These developments, however, do not necessarily constitute an adverse impact. Localized hydrocarbon concentrations have no direct impact on public health and welfare but instead contribute to the formation of photochemical oxidants in the atmosphere. Since oxidant formation is a slow process, the oxidants appear at long distances from the source of hydrocarbon emissions, and a localized concentration of hydrocarbons is not necessarily indicative of an adverse impact. The actual impact of the hydrocarbon emissions from Tinker AFB is better represented by the analysis of regional impact presented above. With regard to the SOx emission density, an adverse impact is not indicated even though the density of emissions at the base is expected to exceed that in the central part of the Region by nearly 20 percent. The existing SOx concentrations in the Region are so low that considerably higher

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* Hydrocarbons are precursors to the formation of photochemical oxidants.

Table 4.5.2-A

Anticipated Contribution of Tinker AFB to
CENTRAL OKLAHOMA AIR QUALITY CONTROL
REGIONAL AIR POLLUTANT EMISSIONS

Source	CO	HC	NOx	SOx	Part.
All sources in Central Oklahoma Region - 1970 (10^6 Kg/yr)	325	76.6	67.1	5.32	12.5
TAFB Emissions - 1974 (10^6 Kg/yr)*	1.4	1.2	0.88	0.12	0.09
TAFB Emissions - 1974 (Percent of regional total)	0.4	1.6	1.3	2.2	0.7
TAFB Emissions - 1981 (10^6 Kg/yr)*	1.6	1.6	1.2	0.13	0.14
TAFB Emissions - 1981 (Percent of regional total)	0.5	2.1	1.7	2.5	1.1
Change in regional emissions due to TAFB - 1974-1981 (Percent)**	0.1	0.5	0.4	0.3	0.4

*Includes emissions from aircraft flight operations below 3000 ft. altitude.

**Assuming regional emissions other than those from Tinker AFB in 1974 to 1981 are the same as the estimates made for 1970.

Table 4.5.2-B

Anticipated Air Pollutant Emission Densities at Tinker AFB and in the Central Oklahoma Air Quality Control Region

Zone	Emission Density (10^3 Kg/Km^2 yr)				
	CO	HC	NOx	SOx	Part.
Tinker AFB - 1981*	88	92	45	6.9	6.1
Zone I - 1970**	354	84	73	5.8	6.8
Zone II - 1970	226	53	47	3.7	4.4
Zone III - 1970	90	21	19	1.5	1.7

*Based on emissions from all ground operations at Tinker AFB.

**Zones defined in Figure 3.3.2-B. Tinker AFB is located in Zone II.

emission densities would be required to cause an adverse impact. This conclusion has been verified by means of a simple atmospheric dispersion model. The modeling results indicate that the ambient SOx concentrations anticipated in 1981 will still be below the limits of detection.

The anticipated air quality impact of Tinker AFB in 1981 can be summarized by the following statements.

The introduction of AWACS will result in an increase of total emissions of hydrocarbons in the Central Oklahoma Air Quality Control Region of approximately 0.5 percent. Hydrocarbons are precursors to the formation of photochemical oxidants, and oxidant concentrations in the Region exceed the air quality standard at the present time. Consequently, the increase in hydrocarbon emissions can be expected to aggravate an existing problem with photochemical oxidants.

AWACS introduction will result in an increase in total emissions of particulates in the Region of approximately 0.4 percent and an increase in the particulate emission density at the base to levels now observed in the central zone of the Region. Particulate concentrations in the Region exceed the air quality standard at the present time, and the control of particulates is made difficult by relatively high background concentrations from natural sources. The increase in particulate emissions at the base can be expected to aggravate the problem of particulate control in the region and may also result in excessive particulate concentrations in the vicinity of the base.

Increases in emissions or other pollutant classes will not result in adverse impacts.

4.5.3 ESTHETIC IMPACT

The AWACS aircraft are powered by engines that produce exhaust plumes which can be characterized as "slightly visible." The magnitude of visible smoke emission from an aircraft engine is indicated by an empirical index called a "smoke number." This index is determined by a standardized procedure involving sampling and optical analysis of particulate material in the engine exhaust. Engines with smoke numbers above a threshold value of approximately 30 can be expected to produce visible smoke plumes, and the plume opacity will increase as the smoke number increases above the threshold value. The AWACS aircraft engine is reported to have a smoke number of 40, which is lower than the numbers reported for other aircraft engines presently in use at the base (e.g., SN = 51 for the C-135 aircraft engine and 65 for the F-4 aircraft engine). As discussed earlier in Section 3.3.2.4, the present impact of visible smoke at Tinker AFB is judged to be small. The added impact resulting from the AWACS aircraft also will be small since the plume opacity for this aircraft is less than that from aircraft presently in operation at the base.

4.6 IMPACT OF CONSTRUCTION RELATED TO AWACS

Rehabilitation of existing structures and construction of new facilities to support future AWACS operations at Tinker AFB have been described in Section 2.7. The anticipated environmental impacts will be local and short term in nature.

Of the 12 separately identifiable proposed construction projects for Tinker, the majority are located at or near the main apron area. The major portion of the construction activity will be some 3,200 feet south of the base northern boundary at S.E. 29th Street and is shielded from direct line of sight to Midwest City by many of the large existing base buildings. Construction activities not located within this general area include the education center (400 feet from the base hospital), officer's quarters, family housing, and the airmen's dormitories.

Most construction will, therefore, take place in areas where land use has already been committed for aircraft-related activity. There will be short-term noise impacts and local dust created by site excavation and other construction activities. There will be a slight increase in traffic due to the delivery of building materials and construction crews traveling to and from the base.

4.6.1 NOISE DUE TO CONSTRUCTION ACTIVITY

The noise levels due to some of the proposed construction projects will likely affect some residents of Midwest City, along Sooner Road particularly, and also some of the Tinker work force in nearby buildings. Although the construction schedule has been established for each of the projects, the actual numbers and types of construction equipment and their individual scheduling and location is at the choice of the contractor and is based on equipment availability and other factors. Thus, the noise that will be produced by the construction can only be approximated at this time. It has been established, however, that a typical construction site with the usual variety of equipment generates approximately 89 dbA at a 50-foot distance [65]. Using this average level, and known noise attenuation factors for shielding and distance, together with annoyance and interference criteria allows an estimate to be made on the expected impact of noise during the transient period of construction.

The EPA has recommended that, to protect public welfare, equivalent noise levels i.e., steady dBA levels, should not exceed 45dB indoors or 55dB outdoors [66]. A less stringent requirement has been proposed for speech interference levels, which suggest that conversation in a normal voice at six feet will result in 95 percent sentence intelligibility, which is adequate in most circumstances, if the background noise level is at 60dBA or less. Allowing a 15 dB reduction afforded by well constructed building walls with closed windows, it can be estimated that

speech interference will occur at locations closer than approximately 250 feet from any one construction site, and that the outdoor annoyance level will be exceeded typically out to 2500 feet from the sites.

With the multitude of sites and the use of different types of construction equipment among sites, it is not feasible to define this impact in any greater detail. It is more than likely that such construction noises will be insignificant compared with the aircraft generated noise as described in Section 4.2.3. Furthermore, the short construction periods of some of the structures, such as the education center (400 feet from the base hospital), a family housing, and the officers' quarters should provide but a temporary noise annoyance to the nearby base population.

Perhaps of most significance will be the construction of the airmen's dormitories, next to Sooner Road, approximately 400 feet from the nearest civilian housing, located to the immediate west of the construction site. This construction, in two phases, will extend over a two-year period. An analysis of the traffic on Sooner Road and the noise levels during commuting hours showed levels at the nearest row of houses that were lower than the 55 dBA level recommended for outside daytime noises by the EPA [66]. For this construction, with a shielding reduction of 10dB for multiple rows of houses included, it is estimated that the 55dBA level will occur at a distance of about 800 feet. Without shielding, the distance will be as much as 2500 feet. Thus, within this 800-foot distance and bordering Sooner Road out to 2500 feet, there are approximately 120 residences that will experience construction noise levels about 55 dB(A). A smaller portion of these residences bordering Sooner Road, and directly facing the construction site, will be experiencing levels considerably in excess of the EPA recommendations and thus could be adversely affected. Since construction is usually confined to the daylight hours, the effect of this impact will be less than that normally associated with noise sources, such as aircraft operations and freeway traffic, which are generating noise levels during the entire day.

4.6.2 IMPACT ON NON-POINT RUNOFF FROM THE PROPOSED FAMILY HOUSING

In addition to the construction impacts already described, the development of the proposed 200 units of family housing, if built, will increase non-point source runoff to area streams and may result in localized areas of erosion before the site is finally landscaped.

The 200 units of family housing will be constructed at the site as shown in Figure 2.7-A. The area of the site is located southwest of Tinker AFB, bounded on the west by Crutcho Creek and on the east by a tributary of Crutcho Creek, encompassing approximately 70 acres of land within the Crutcho Creek drainage basin. Three small tributaries of Crutcho Creek (Tributary A, Tributary B, and Tributary C) traverse Location 1 in a south easterly direction. The confluence of Little Crutcho Creek and Crutcho Creek occurs north of Vandenberg Street. The portion of the Crutcho Creek drainage basin upstream of Vandenberg Street, shown on Figure 4.6.2-A has an area of 10.7 square miles. The channel slope of Crutcho Creek is approximately 23.9 feet per mile in this area.

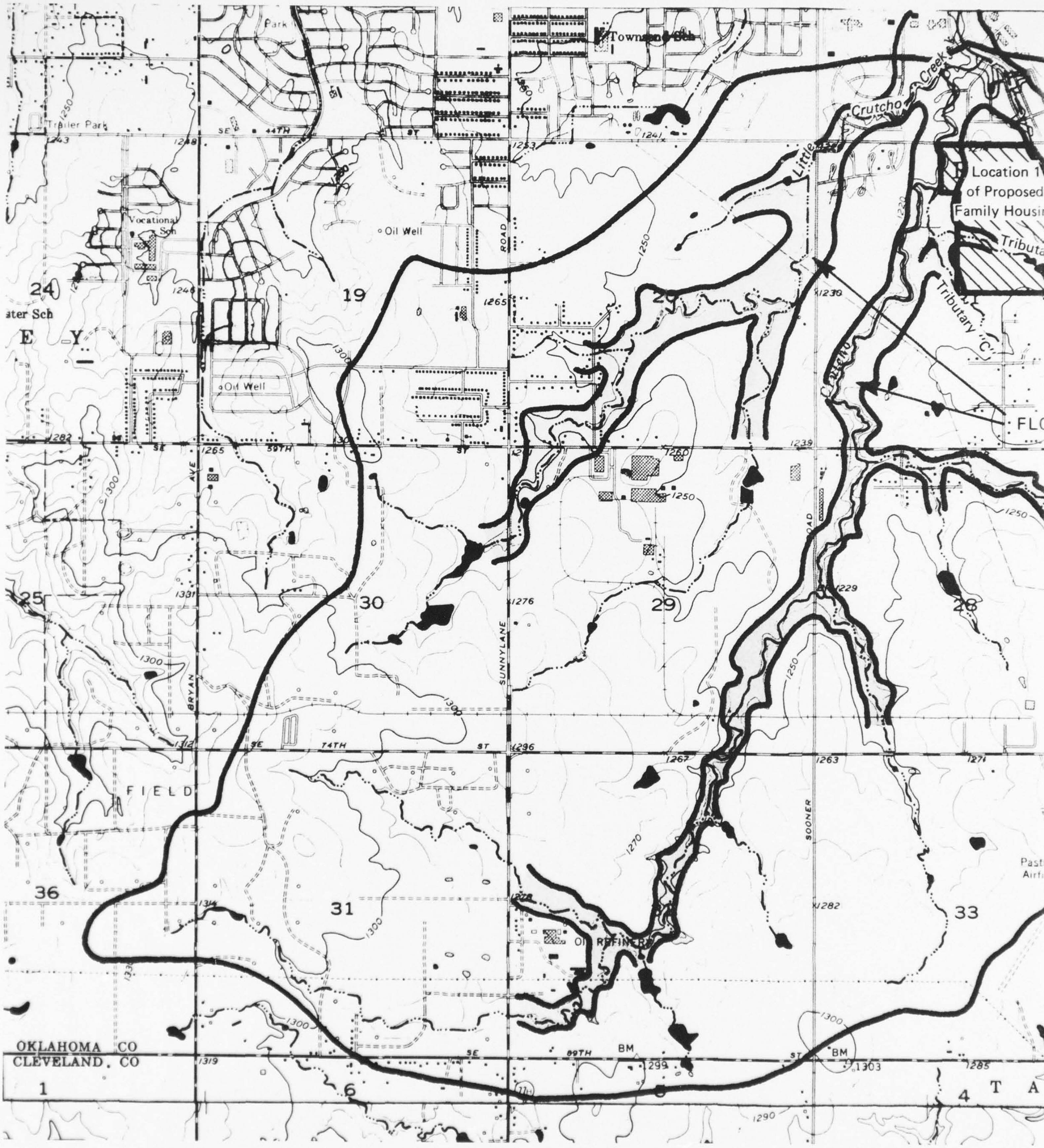

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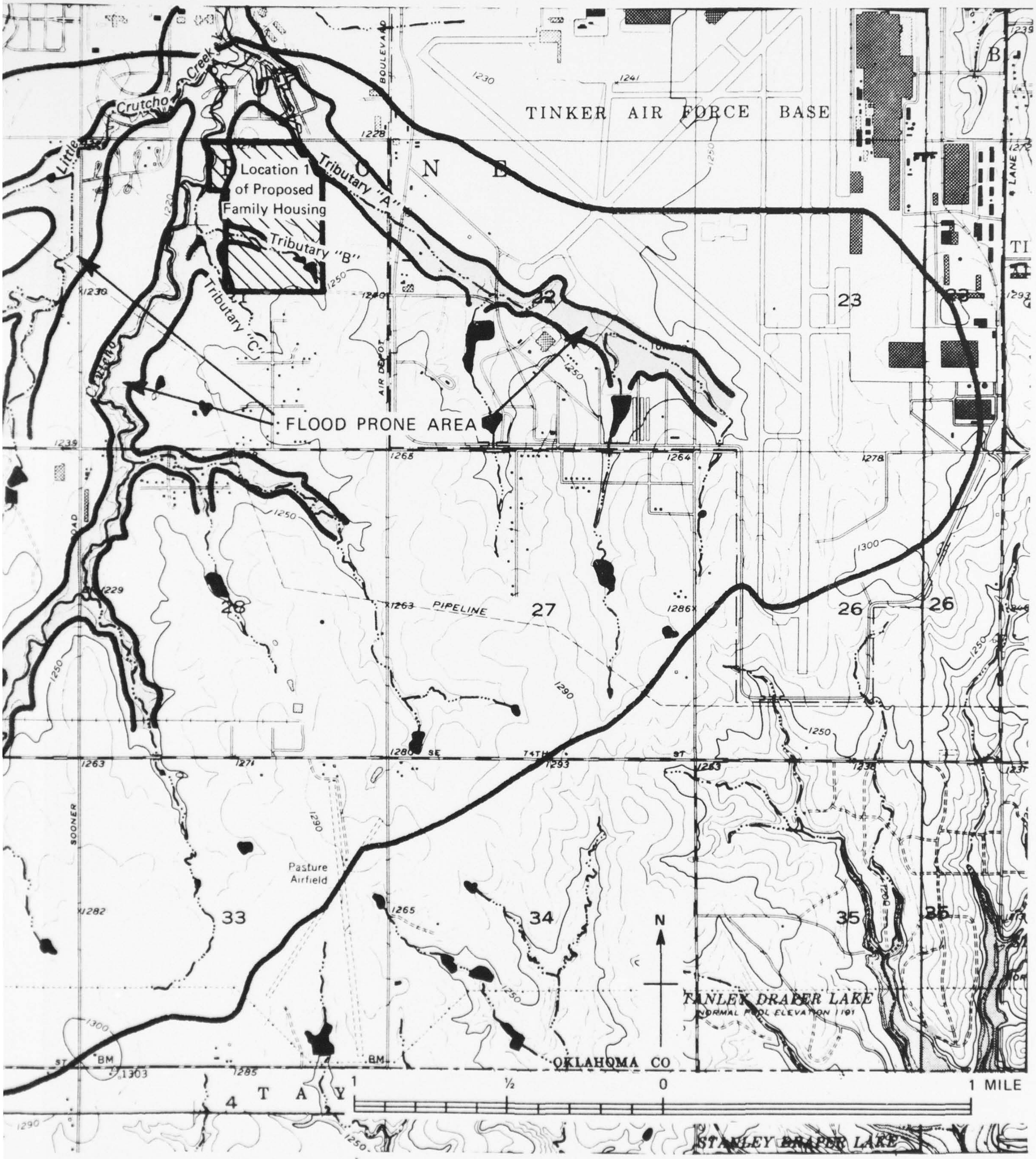
FIGURE 4.6.2–A CRUTCHO CREEK DRAINAGE BA



4.6.2–A CRUTCHO CREEK DRAINAGE BASIN

2

The construction of 200 family housing units will alter the character of the site from that of an undeveloped area to that of residential development and roadways. A major impact on the Crutcho Creek drainage basin will be the introduction of man-made impervious surfaces (e.g., roads and rooftops), to the rural, undeveloped site, thus affecting runoff. Flood runoff will be affected by the urbanization in two ways:

1) The water volume of runoff will increase as a result of reduced infiltration of rainfall over impervious surfaces.

2) Curbing, gutters, drains, and storm sewers will facilitate the movement of water, thereby concentrating the runoff into a shorter time period [52].

These combined factors will result in increased peak discharges into the Crutcho Creek basin.

Location 1 encompasses a land area of approximately 4,267,000 square feet representing 70.4 acres. The resulting man-made impervious surfaces are estimated to cover 50% of this site--approximately 2,133,500 square feet [52].

At the present time, the drainage basin of Crutcho Creek above Vandenberg Street is approximately 3% impervious.* The proposed housing development would add approximately 7.7% of impervious surface. This total 10.7% impervious surface may slightly affect flood runoff, but will not significantly increase the discharge within the crutcho Creek drainage basin (see Appendix F for derivations).

The U.S. Geological Survey in Oklahoma has defined a relationship between urbanization and flood discharge as being [68]:

$$Q_{X(u)} = \frac{7R_X Q_2 \ (R_L-1)}{6} + Q_X \ \frac{(7-R_L)}{6}$$

where: Q_T = the annual peak discharge having a x-year recurrence urban interval which incorporates urbanization effects, in cubic feet per second (c.f.s.),

R_L = the "Leopold factor" incorporating percent impervious cover and storm sewers into an urbanization coefficient, and

Q_X = annual peak discharge having a x-year recurrence interval, in natural conditions, in cubic feet per second (c.f.s.).

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*Personal communication, William Thomson, U.S. Geological Survey, Oklahoma City, Oklahoma, January 3, 1975.

The R_L factor for a 10.7% impervious surface value in Location 1 equals 1.1 [68]. Therefore the $Q_{T_{URBAN}}$ would equal 6578 c.f.s. for Q_{100}. Thus the peak discharges for this area of Crutcho Creek, which were developed by the U.S. Army Corps of Engineers, will essentially remain the same. The land for the proposed housing, some part of which is situated in a designated 100-year flood prone area* (see Figure 4.6.1-A) will not cause a significant rise in water elevation, or change the 100-year flood boundaries as they presently exist.

Construction will be carried out in accordance with appropriate Air Force regulations, federal safety standards, and applicable building code regulations.

*Map of Flood Prone Areas, prepared by HUD in conjunction with the USGS, Oklahoma City, Oklahoma, 1974.

4.7 IMPACT ON THE AREA ECONOMY

The proposed beddown of the AWACS Wing will have its most concentrated impact on the area economy during the related construction activity. A major construction effort at the base will include new facilities construction, facilities alteration, and possibly a 200-unit family housing project. Construction expenditures over a three-year period could exceed $36 million, and past experience indicates that a portion of this total will be spent in the local economy for both goods and labor.

Nearly 3,200 military personnel and 300 civilian personnel will be assigned to Tinker AFB in support of the new mission. This increase will nearly double the present military manpower levels at the base. On the basis of 1974 pay scales, this is estimated to represent a $32 million increase in the total annual military payroll. Over the same time period as the implementation of the AWACS mission, the civilian workforce at the base is expected to decline by nearly 1800; 1974 pay figures indicate a resulting decrease in the payroll of $31 million, although the general military manpower cutbacks, not the AWACS mission, are responsible for this decrease. If the AWACS beddown is completed as proposed, the combined military and civilian work force at the base will be increased by 774 personnel. Without AWACS, the total work force would decline by about 2,700 personnel.

Projections for the area economy, described in Section 3.5.3.2 of this report, include a small (0.3 percent) increase in Federal Government employment in the Oklahoma City SMSA [8]. The net manpower increase resulting from the AWACS beddown would represent more additional federal jobs than predicted in these projections.

Insofar as the AWACS mission will bring different and increased activities to Tinker AFB, it is expected that expenditures by the base for goods and services will also increase, although the precise amounts and types of these expenditures are not known at the present time. On the basis of past experience with procurements, approximately 5 percent of the increase in direct civilian contracts would be awarded to concerns in the greater Oklahoma City area. Since the AWACS mission will nearly double the numbers of military assigned to Tinker AFB, expenditures such as purchases for resale at the Base Exchange and Commissary and for recreational services and open messes are expected to increase substantially.

4.8 IMPACT ON SERVICES AND FACILITIES

Base housing may be expanded to accommodate some of the military personnel associated with AWACS. With this proposed increase, about 4000 individuals, a number of whom will be eligible for on-base housing, would require off-base housing. The Housing Referral Office (HRO) will have an increased responsibility in aiding such persons in finding suitable housing.

The addition of approximately 3,200 military personnel assigned to Tinker AFB will have an impact on the military community serviced by the base hospital. As military personnel associated with AWACS will receive priority treatment, the hospital may have to limit the numbers of retired persons and their dependents as well as active military dependents to whom they extend their services. This will result in an increase in claims under the CHAMPUS program and greater numbers of individuals seeking health services from the surrounding community. As stated in Sections 3.6.1.4 and 4.9, area hospitals and related health services will be able to accommodate this increase.

Both the recreation and education service programs will need to be expanded in order to accommodate this increase in military personnel.

Aircraft fuel consumption, AGE fuel consumption, and electricity consumption are all expected to increase at Tinker AFB as a result of the AWACS Beddown. The AWACS aircraft is not replacing any aircraft at Tinker, so its effect on fuel usage is purely additive. JP4 fuel used by this aircraft will show up as a net increase in base jet fuel consumption.

The E-3A is a very special aircraft requiring much more AGE equipment per sortie than most other aircraft. AGE currently in use at Tinker utilizes only MoGas and JP4, while the AGE for the aircraft will also require diesel fuel. Because of the special servicing requirements, the AWACS AGE will utilize proportionally more fuel per sortie than the AGE of other aircraft, hence, the percent change in AGE fuel consumption appears to be much larger than one would expect.

New ground support facilities will be constructed to complement the airborne AWACS system functions. These facilities will house sophisticated electronic equipment in classrooms and flight simulators, and hence the utilization of electric power is expected to increase by approximately 1,920 million watt hours per year.

These facilities will replace other buildings on almost equivalent area basis, so that the total building floor space on the base is not expected to increase significantly. Furthermore, the new buildings will utilize modern construction techniques and materials and should therefore require less heating and cooling per unit area than the structures which they will replace. Thus, there is no real change expected in the base heating/cooling load, and natural gas and fuel oil consumption are not expected to change significantly.

Table 4.8-A presents the projected 1981 energy utilization figures for TAFB with the AWACS wing in full operation. Also shown is the percent change in energy utilization from 1974 levels (see section 3.4.4).

An increase in demand on water and sewage facilities is anticipated. The increased demand will result directly from the increase in employee population and also to a shift in housing to on base dormitories and to the military family housing area which is only, in part, a consequence of the AWACS beddowns.

Per capita consumption or potable water has been computed at 160 gpcd for family "full time" residents. Construction of 200 family housing units and 986 new dormatory spaces will result in an increase of demand of 295,360 gpd [(2.3 children per family) x (200 units) + (200 units) x (1 husband + 1 wife per unit) + 986 residents in dormitories] x [160 gpcd].

Allowing for a 100 gpcd contribution of domestic wastewater for Tinker residents, an increase in the average demand of 184,600 gpd will result. Better than 95% of this amount will flow into the sewerage system of Oklahoma City, with the residual flowing to the Tinker facility. No problems are anticipated in either instance.

The amount of industrial sewage demand resulting from AWACS is considered negligible.

The above estimates are conservatively made assuming full occupancy of base housing and dormatories and that all military personnel assigned to the AWACS will live on base. Flows estimated, are, therefore, higher than the actual flows anticipated.

Table 4.8-A

Energy Utilization, 1981 Projections

Energy Source	Use	Quantity[(1)]	Energy Consumed BTU	Percent Change
JP4	Jet Fuel	73,499,325 gal/yr	9.061×10^{12}	+ 96%
Aviation Gasoline	Piston Aircraft	1,678,682 gal/yr	1.952×10^{11}	0
87 Octane Gasoline	Ground Vehicles**	1,239,967	1.583×10^{11}	+ 13%
Diesel Fuel	Ground Equipment	478,511	6.463×10^{10}	117
Fuel Oil #2	Emergency Heating	564,588 gal/yr	8.126×10^{10}	0
Natural Gas	Heating, Steam	$2,477 \times 10^{6}$ ft^{3}/yr	2.601×10^{12}	0
Electricity	Lighting, Machinery	189.27×10^{6} KWH	6.458×10^{11}	0
		TOTAL	1.279×10^{13}	+ 54%

(1) Source: See Appendix A

**Does not include fuel sold by the base exchange for use in private vehicles.

4.9 AREA SOCIAL IMPACT

In October 1981 the military population at Tinker AFB will have increased to 5,572 persons, an increase of 2,559 persons. The major impacts associated with this population increase will be felt within the local housing market and within the local school system.

On-base housing is currently available to 1,286 persons at Tinker AFB and if all proposed AWACS housing were to be approved this figure would be further increased to 2,480 Approximately 2,100 military persons and their families will require off-base housing, increasing the current demand. Without the proposed AWACS housing, including dormitories, the number of military persons seeking off-base housing would be increased to 4,300 The civilian population which will number about 16,800 employees in 1981, will continue to require off-base housing.

At the present time a deficiency in suitable off-base housing for military personnel exists and will further increase with the arrival of AWACS personnel (see Section 3.6.1.1). In that AWACS personnel will be phased-in over a 56 month period, the influx of military personnel requiring off-base housing will be gradual. In the past, 80% of the military population residing off-base lived within the Midwest City and Del City area. At the present time the availability of single-family homes in this area is limited. Apartments are available within this area but, as described in 3.6.1.1, these do not generally meet the needs of military personnel. It is reasonable to assume that greater numbers of military personnel will be forced to reside in communities further from Tinker AFB due to the housing shortage in the immediate area.

The second major impact associated with the population increase will be on the local school systems, primarily the Midwest City - Del City District (Independent District No. 52). As of June 1978, there could be 200 additional families residing on base. If the current situation of 2.3 children per family prevails, there will be about 460 additional children on base.* Eighty percent or 368 of the AWACS children would be of school age, increasing the number of Class A dependents to about 1,350. Under the current school district plan, these children will attend Midwest City and Del City schools. This will represent a substantial and concentrated increase in dependents of Tinker employees. At the present time the schools within this district, as described in 3.6.1.2, are operating at or close to capacity.

The increase in membership to all Oklahoma County school districts will be dependent upon where military personnel residing off-base choose to locate.

The addition of the 3,512 personnel and their families will have no adverse impact on area health services or on recreational facilities.

*1973-1974 Tinker AFB: 536 families and 1,220 children with 976 of school age.

4.10 ECOLOGICAL-BIOLOGICAL IMPACT

There are two phases associated with the proposed action: construction and rehabilitation of facilities during the 20-month AWACS phase-in period and the actual activity of the E-3A.

Construction activity, with the exception of the 200 units of family housing, will occur in areas of existing intensive development as shown in Figure 2.7-A. The proposed family housing will be located on an area of about 70 acres that is currently an undeveloped tract of grassland used by HQ 3rd Mobile Communications Group as a training area. Prior to this time the land was under agricultural use.

This site does not represent a unique habitat within the region nor is it the habitat of any rare and/or endangered species. The conversion of this land to intensive residential use should not be of concern to the existing wildlife populations in that similar environments are abundant within the area.

The introduction of the E-3A will see the alteration of Tinker from a maintenance to an operational base with an accompanying increase in aircraft traffic. The introduction of AWACS will result in increased noise levels, increased total emission of hydrocarbons (precursors of photochemical oxidants) and increased levels of particulates as discussed in 4.5.2. Inasmuch as Tinker's past and future presence makes up part of the whole of the areas of human encroachment on the natural environment, the air base with or without the E-3A is contributing to the total impact on nearby natural areas. It is not anticipated that the operation of the E-3A of itself with exert an adverse impact on natural areas.

4.11 ELECTROMAGNETIC RADIATION HAZARD

The operation of the AWACS transmitters, in particular the surveillance radar identification transponder and communication transmitters, necessarily results in the propagation of electromagnetic radiation. While airborne, the radar normally will not be in operation below 20,000 feet, thus limiting radiation at ground level. The Occupational Safety and Health Administration, Department of Labor, has published a maximum personnel exposure limit of 10 mW/cm^2 for radiofrequency electromagnetic radiation. This level of radiation extends to a distance of 1250 feet from the AWACS aircraft. Airborne operation of AWACS radar above 20,000 feet will not result in hazardous radiation levels on the ground. Cardiac pacemaker tests also indicated no adverse effects on the ground from airborne AWACS aircraft. Current plans do not include the utilization of the radar on the ground other than for brief maintenance checkout. Features of the radar (i.e., beam elevation, sector blanking and radiating into a dummy load) will permit control of the electromagnetic radiation for this situation. Personnel will be prevented from being exposed to electromagnetic radiation levels in excess of 10 mW/cm^2 if the radar is operated on the ground during maintenance checkout.

5.0 ALTERNATIVES TO THE PROPOSED ACTION

5.1 GENERAL

The E-3A Airborne Warning and Control System (AWACS) is being developed for strategic and tactical applications. A new radar has been developed for the system to enable all altitude surveillance of moving targets over both land and water. AWACS will provide a highly mobile, survivable, all altitude command and control platform for support of the strategic and tactical missions. Although being funded as a General Purpose Forces aircraft, the AWACS can assume two vital roles with a common airframe configuration. In a tactical role, the AWACS can quickly deploy as required -- anywhere in the world -- to closely monitor the developing air, ground, and sea situation providing surveillance, tactical warning, battle management functions and control of aircraft. AWACS will provide the capability to direct close air support, interdiction, air superiority, reconnaissance, airlift, search and rescue, and air defense operations. This capability, employed early in a conventional conflict, could well result in a cessation of hostilities and thus preclude a protracted struggle. Since the AWACS radar can probe deeply into would-be enemy territory, AWACS will be a very effective deterrent to hostile actions. As an air defense, it can provide airborn surveillance to detect, identify, and track airborne targets at any altitude over extended distances from the boundaries of the United States. It can provide the command and control capability needed to direct fighter-interceptor aircraft to the target. Its beddown should be chosen to insure accomplishment of long range deployments in a timely, orderly, and economical manner in a location that is conducive to operational effectiveness and mission accomplishment. Alternatives considered in planning for the basing of AWACS aircraft are discussed below.

5.2 NO ACTION

Acceptance of this option requires no major action to be taken to improve the capabilities of the current fighting force. Such an alternative implies that a serious problem or deficiency does not exist, which is untrue. The impact of doing nothing significant to develop, produce, and deploy AWACS with well-trained combat aircrews then becomes a question of whether the national defense posture can justifiably withstand the consequence of a complete lack of Airborne Warning and Control capability over postulated threats in the future. A properly trained and employed AWACS, on the other hand, completely reverses this picture. To progress in a timely, organized and economical manner to meet the threat, the AWACS must be based at some location.

The Air Force is currently obligated to purchase 6 E-3A aircraft which are scheduled for delivery between March 1977 and December 1977. If a permanent beddown site is not provided with the required facilities to support the AWACS mission, these aircraft cannot be effectively utilized. After review of the environmental statement on the AWACS aircraft, it was determined that any significant impact associated with this aircraft would result from its beddown and operation. This statement is being prepared to address all impacts and thus negate the "no action" alternative.

5.3 ALTERNATIVE BASES

Operational and employment considerations including contingency commitments, force management, flexibility, responsiveness, training requirements and capabilities, have primary influence on basing options. Consideration is also given to the possible CONUS air defense mission and the need for maintaining an acceptable surrounding environment.

5.3.1 SELECTION CRITERIA

National policy dictates that tactical forces must be able to respond to both a major and a minor contingency at the same time. To assist in achieving this mission, the Tactical Air Command (TAC) has been designated the single manager of AWACS forces and will establish the operational AWACS wing; conduct the combat crew training program; and, in conjunction with the Air Force Test and Evaluation Center, provide for the operational testing and evaluation programs. Criteria in order of priority for selection of a beddown location are as follows:

- The maintenance complex at the main operating base (MOB) must have access to full organizational and intermediate level maintenance capability, backed up by AFLC depot maintenance and supply support.
- The AWACS force must be responsive to world-wide JCS tasking, and therefore, the location of the MOB should be optimized in terms of overseas deployment time to all theaters and peripheral areas of the North American Continent, with consideration being given to integration of the AWACS into the CONUS air defense role.
- Minimum facility deficiencies and minimum Military Construction Program (MCP) cost.
- Environmental considerations.

These criteria are consistent with current Air Force policy to streamline operations by using innovative operational and maintenance concepts. Due to budget restraints and inflation, the Air Force is committed to improving organizational and managerial methods of the past. Our task in bedding down the AWACS weapon systems is to explore every concept of operation, using valid criteria identified above, to produce the greatest cost avoidance during its life cycle and maximize operational requirements.

In determining AWACS basing a significant and overriding factor is ready access to depot and intermediate level maintenance to reduce life cycle cost of the system. For example, collocating with the depot eliminates the expense of ferrying AWACS aircraft to the depot when major maintenance becomes necessary. This provides a cost avoidance and also reduces the time required to return aircraft to operational status once maintenance has been completed, thereby enhancing the combat readiness posture of the Air Force. This will help ensure that the number of operational aircraft required to support the mission are available when needed. Additional significant savings will result through the establishment of a single supply point to service all levels of maintenance for the AWACS weapon system.

In addition to the foregoing factors, it is anticipated that the AWACS will be called upon to perform an air defense role. Therefore, proper geographic positioning to allow integration into the CONUS air defense system and still remain responsive to world-wide deployment for contingencies becomes important in selecting a base for the AWACS beddown.

The physical facilities required for AWACS beddown are similar to those for KC-135/C-141 aircraft. Runway length requirements are not unique. Runways capable for present tanker/transport type operations are considered adequate. Modification of some maintenance facilities and a requirement for a sophisticated avionics facility are the major apparent differences. Airfield ramp space required is similar to the KC-135/C-141 requirement.

Environmental considerations entail evaluation of the environmental impact on air quality, noise levels, water and sewage requirements, schools and housing at alternate bases being considered.

5.3.2 BASES CONSIDERED

All CONUS bases representing all USAF major commands were initially screened and the vast majority were eliminated due to one or more of the following reasons:

- Lack of depot and intermediate level maintenance capability.
- Location within the US with respect to employment/deployment considerations.
- Cost effectiveness (gross facility deficiencies/excessive MCP cost).
- Environmental consideration.

As a result of this screening, bases in all major commands except AFLC were eliminated. Two factors influenced this decision: (1) Only AFLC bases with an existing depot maintenance mission were considered due to operational readiness enhancement and life-cycle costs of ferrying the AWACS to the depot for maintenance, and (2) There have been identified two separate and distinct computer hardware and software requirements for the AWACS. First, according to the present concept, the MOB will contain the operational software support equipment (i.e., for the mission simulator, flight simulator and the aircraft maintenance mobile trainers). Secondly, AFLC has identified almost identical hardware requirements for systems hardware/software integration which must be carried out at the designated AWACS support Air Logistics Center (ALC). By collocation, only one large scale computer (IBM 360/370 or equivalent), with the peripheral equipment can accommodate both TAC as well as AFLC requirements. $20M in identifiable cost avoidance could be realized over a ten-year period through collocating and optimizing use of existing systems hardware by negating the requirement to purchase and install two identical and comparable computer systems.

<u>HILL AFB, UTAH</u>:

<u>Depot and Intermediate Maintenance Facilities</u>. This criterion is only partially met since any depot maintenance function would require the AWACS aircraft to be ferried for engine and airframe maintenance at Tinker AFB. To attempt to duplicate the required depot maintenance facilities at Hill is not practical due to the prohibitive cost. Currently, the Ogden ALC at Hill AFB supports a variety of missions including worldwide logistic management for assigned weapon and support systems, equipment, and commodity items. Ogden ALC performs an industrial type mission in providing maintenance, supply, and procurement type services essential to Air Force logistics, and provides area support to USAF activities within a specified geographic locale. It also supports the USAF's entire fleet of intercontinental ballistic missiles and manages some of the most important space and aircraft missions. Ogden's missile mission includes systems support management of the Minuteman and Titan II ICBMs. Aircraft management includes the fighter and reconnaissance versions of the F-101 Voodoo and support of the F-4 Phantom. A unique mission is the logistic management of all air munitions, solid propellants and explosive devices used throughout the Air Force.

Employment/Deployment Considerations. AWACS beddown at Hill AFB does not provide an optimum location within the CONUS for both European and Pacific contingency deployments. Using a ground speed of 450 knots either way, Hill is 560 nautical miles (NM) or 1 hour and 15 minutes flying time to the West Coast and 1730 NM or 3 hours and 51 minutes to the East Cost.

Minimum Facility Deficiencies/MCP Costs. This base has sufficient existing buildings, plants, and systems to support the current and projected ALC workloads for several years. Capital improvements required in the next ten years to support existing missions would be directed at replacement of approximately 145 temporary and semi-permanent buildings, upgrading major utility systems, modernizing facilities to conserve energy and consolidation of widely separated, but related, depot missions. However, to accept another major mission such as the AWACS, extensive facility construction would be required. Additional operational apron, maintenance facilities, squadron operations, and airman dormitories are a few of the basic construction projects which would be required. The estimated aggregate cost for the Main Operating Base (MOB) facilities is approximately $45M. The estimated aggregate cost for constructing new depot facilities and purchasing depot maintenance production equipment will be in excess of $100M. A valid consideration, and one that is being carefully analyzed, is the projected increase of investment costs dealing with fossil fuels. At present, the base utilizes natural gas and fuel oils as energy sources for large central heating plants. The future availability of these fuels has not been fully defined and consideration is being given to enact legislation which may require these plants to convert to coal fuel plants. This investment may be a negative factor in the assignment of additional missions to this depot.

Environmental Impact:

(1) The weather is generally good for all flying operations. Broken to overcast skies occur approximately 70 percent of the time from December to March. Clear skies occur 30 to 45 percent of the time from April through November. There is generally less than one day per year with a high meteorological potential for air pollution.

(2) No significant impact on airspace utilization would be anticipated due to the increased density of daily flying activities in the area. There are, however, some constraints to the flying activity. Headquarters USAF recently established

a General Officer Panel on Midair Collision Potential. Based upon this Panel's findings, Hill AFB has been identified as a base requiring priority action to reduce midair collision potential to a practicable minimum. The proximity to the Ogden Municipal Airport requires careful control and coordination for all aircraft, although traffic control equipment and manning are adequate to absorb the increase in flying activity that would accompany the AWACS mission. Hill AFB has mountainous terrain and high field elevation. Pilots not accustomed to flying heavy aircraft from airfields as high as Hill (altitude 4,788 ft) will notice a difference in take off and climb performance.

(3) The AWACS operations would be in addition to the current flight test operations of the overhauled F-4's and F-101's, and flight operations of the 388 TFW (F-4 aircraft), 301st TFW (AFRES) (F-105B aircraft), and the 6514th Test Squadron (AFSC) (C-130 and helicopter aircraft). Hill AFB is located in the Wasatch Front Air Quality Control Region 220. As a result of the beddown of the AWACS mission at Hill AFB, the yearly emissions level in the region would increase by the following percentages:

Carbon Monoxide	0.11%
Oxides of Nitrogen	0.46%
Oxides of Sulfur	0.01%
Hydrocarbons	0.50%
Particulates	1.3%

(4) Currently, measured pollutant concentrations for those items listed above are maintained at a recording station within nine miles of the base. The region has exceeded national ambient air quality standards for carbon monoxide many times throughout the year. The only air pollution episode in the region occurred in Salt Lake City (approx 30 minutes from Hill AFB) in 1972 for carbon monoxide. Addition of this mission might increase the number of times that the carbon monoxide standard is exceeded. In addition, national standards for sulfur dioxide and hydrocarbons are sometimes exceeded. The AWACS mission would tend to aggravate compliance with established standards for these pollutants.

(5) Current aircraft operations at Hill generate approximately 462 take offs, landings, and go-arounds daily. Introduction of the AWACS would increase this total by 62 operations per day (i.e., to 524 take offs, landings, and go-arounds daily), a 12 percent increase. A larger land area

around Hill may be affected by an increase in noise levels due to the AWACS flying operations. However, the basically compatible conditions which exist in the Hill AFB environs are a result of low density land use in the area. Minor modifications to the building codes, zoning maps and comprehensive plans may be required to assure continued compatibility in the future between the base and adjacent users.

(6) Based on current TAC population statistics, an average of 65 percent of assigned personnel are married. With the projected manning for AWACS of 3512 , the family housing requirement would be 2282 units. Based on the information in the latest Hill AFB housing referral survey, sufficient housing is available in the local area to accommodate the AWACS mission.

(7) The influx of personnel to operate and maintain the AWACS would create an increase in demand for potable water and sanitary sewage treatment. Potable water is provided by wells operated by Hill AFB. Expansion of the system could be accomplished and ample water is available. Treatment of sanitary waste is accomplished by contract with the North Davis County Sewage District and expansion capability exists.

(8) Based on the projected manning of 3512 , the estimated increase in dependent population would be approximately 4200 . Of this number, approximately 950 would be school age children that would impose an additional demand on the local public school system. School age children residing on Hill AFB and in the surrounding communities would attend Davis County schools. Calendar year 1976 enrollment statistics indicate that 35,181 students were attending Davis County schools. The capacity of this school system is 33,910 and an increase of 600 students will further tax an already overcrowded condition.

<u>Summary.</u> The mitigating factors against locating the AWACS MOB at Hill make this base one of the least desirable for the following reasons: (1) There are no engine and airframe depot maintenance capabilities for the AWACS weapon system, thus ferrying the AWACS aircraft will be required. (2) This base does not provide the optimum location within the CONUS for <u>both</u> European and Pacific contingency deployments. (3) MCP cost for the MOB will be approximately $45M and, for the depot functions, in excess of the $100M. (4) An increase of 600 students would further tax an already overcrowded condition in the public schools.

KELLY AFB, TEXAS:

Depot and Intermediate Maintenance Facilities. This criterion could be met with some modification to current depot facilities, i.e., providing facilities and equipment to accomplish major engine repair. However, without the modifications any depot maintenance function would require the AWACS aircraft to be ferried to Tinker AFB for engine and airframe maintenance. Currently, the San Antonio ALC provides world-wide logistic management for assigned weapon and support systems, equipment, and commodity items. San Antonio ALC also performs an industrial type mission in providing maintenance, supply, and procurement type services essential to Air Force logistics. The ALC provides area support to USAF activities within a specified geographic locale. The F-5, F-106, C-9, O-2, OV-10, T-43, T-38, T-37, and the F-102 aircraft are all managed by the ALC. It is the systems support manager for the C-5 Galaxy jet transport fleet. In addition, the San Antonio ALC is responsible for a large portion of the depot maintenance for the B-52 bomber fleet. It manages more than one-half of the entire Air Force engine inventory, including such late model engines as the TF-39 and engines used in the helicopter fleets. Additionally, it manages the entire inventory of the aerospace ground equipment including starters, generators and workstands.

Employment/Deployment Considerations. AWACS beddown at Kelly AFB provides one of the better locations within the CONUS for both European and Pacific contingency deployments. Using a ground speed of 450 knots either way, Kelly AFB is 1290 NM or 2 hours and 52 minutes flying time to the West Coast and 1190 NM or 2 hours and 39 minutes to the East Coast.

Minimum Facility Deficiencies/MCP Costs. This base has sufficient existing buildings, plants and systems to support its current and projected ALC workloads for several years. In continuing to provide adequate facilities over the next five years (FY 77-81), the total investment is estimated to be in excess of $75M. This consists of MCP proposals as well as facility projects which are either supported by major command, are funded, or are already contracted. Major facility construction would be required at Kelly AFB to support the AWACS mission. Additional operations apron, hydrant fueling capability, operations and maintenance facilities, and dormitories are a few of the basic items required. The estimated aggregate cost for the MOB facilities is approximately $30M. The estimated aggregate cost for constructing new depot facilities and purchasing depot maintenance production equipment will be in excess of $50M since modification of existing engine and airframe production equipment will be required.

Environmental Impact.

(1) Weather is good in the Kelly AFB area and will not constrain the flying activities of an AWACS wing. Over a 30 year period, 84 percent of the time the cloud ceiling is greater than 1500 feet and visibility is greater than three miles. The base was closed less than one percent of the time during the same period due to fog or heavy rain.

(2) Airspace utilization in the Kelly AFB area is high because of the three major airport facilities: Kelly AFB, Randolph AFB, and San Antonio International Airport. The quantity of air traffic generated at Kelly AFB affects manning of local FAA facilities since manning is based on traffic count. The AWACS mission would increase the total base operations by approximately 10 percent. This increase will be phased in over the next few years, however, and the presently planned expansion of the FAA facilities with additional manpower and equipment would be able to satisfactorily support the AWACS without significant impact. There will have to be coordination with Air Training Command and the FAA to resolve possible scheduling problems for use of the local airspace. Headquarters USAF recently established a General Officer Panel on Midair Collision Potential. Based upon this Panel's findings, Kelly AFB has been identified as a base requiring priority action to reduce midair collision potential to a practicable minimum.

(3) The AWACS operations at Kelly AFB would be in addition to current operations. As a source category within the Metropolitan San Antonio Intrastate Air Quality Control Region, the impact of the AWACS operations would be felt; the increase in total emissions levels in the Region due to the addition of the AWACS mission would be as follows:

Carbon Monoxide	0.15%
Oxides of Nitrogen	0.46%
Oxides of Sulfur	0.08%
Hydrocarbons	0.51%
Particulates	0.11%

(4) Currently, pollutant concentrations for those items listed above are measured at a recording station within 10 miles of the base. The only primary standard exceeded in the region at present is the one for hydrocarbons. The increase in hydrocarbon emissions would thus be additive to a pollutant currently exceeding the primary standard.

(5) Current aircraft operations at Kelly generate approximately 512 take offs and landings and go-arounds daily. Introduction of the AWACS would increase this total by 62 operations per day (i.e., 574 take offs, landings, and go-arounds daily), an 11 percent increase. With this increase in flying activity, the impact of the generated noise will be greater. However, the latest projections of development in the area through 1990 indicate that sufficient area would be available to support this expanding population without adversely affecting the proposed flying mission provided land use controls consider the expanded mission. Recommended zoning restrictions have been identified to help eliminate encroachment problems. Only the few residents currently adjacent to the base would be directly impacted by the additional operations.

(6) Based on current TAC population statistics an average of 65 percent of the assigned personnel are married. With the projected manning for AWACS of 3512 , the family housing requirement would be 2282 units. Based on the latest Kelly AFB housing referral survey, sufficient housing is available in the area to support the requirements associated with AWACS.

(7) The influx of personnel to operate and maintain the AWACS would increase the demand for potable water and sanitary sewage treatment. Potable water for Kelly is provided by seven wells drawing from an acquifer which will supply needs into the 1980s. Planning for a surface supply is underway to augment the wells. Average daily usage is currently 3,757,574 gallons per day (GPD). The additional demand related to the AWACS assignment will not have an adverse effect. Sewage treatment is provided by the city of San Antonio on a contract basis. The additional volume of sewage produced as a result of the new mission can be adequately processed by the existing system.

(8) Based on the projected manning of 3512 the estimated increase in dependent population would be approximately 4200 Of this number approximately 950 would be school age children that would impose an additional demand on the local public school system. The public schools are near capacity and most have long range plans to expand their facilities. However, it is estimated that in order to accommodate this increase in the near future immediate efforts would be required to provide adequate educational facilities.

Summary. After considering the pros and cons relative to each of the established criteria, Kelly AFB has been identified as one of the leading candidates for the AWACS MOB.

McCLELLAN AFB, CALIFORNIA:

Depot and Intermediate Maintenance Facilities. This criterion is only partially met since the engine and airframe depot maintenance function would require the AWACS aircraft to be ferried to Tinker AFB. Duplication of the required depot maintenance facilities at McClellan would not be practical due to the prohibitive cost. Currently, the Sacramento ALC provides world-wide logistics management for assigned weapon and support systems, equipment, and commodity items. Sacramento ALC also performs an industrial type mission in providing maintenance, supply, and procurement type services essential to Air Force logistics. Finally, Sacramento ALC provides area support to USAF activities within a specified geographic locale. In the depot maintenance area, Sacramento ALC is responsible for the repair and modification of F/FB-111, F-105 and F-106 aircraft. It is also assigned the Technology Repair Center for Hydraulics, flight control accessories, electrical components and ground communications and electronics components.

Employment/Deployment Considerations. AWACS beddown at McClellan AFB does not provide a good location within the CONUS for both European and Pacific contingency deployments. Using a ground speed of 450 knots either way, McClellan AFB is 2160 NM or 4 hours and 48 minutes flying time from the East Coast and 80 NM or 11 minutes from the West Coast.

Minimum Facility Deficiencies/MCP Costs. This base has sufficient existing permanent buildings, plants, and systems to support its current and projected ALC workloads for several years. Funded construction projects for a new aircraft overhaul facility, a metals processing facility and a materials processing building enhance the capability of the ALC to accept future workloads for currently assigned missions. Major facility construction would be required to support the added AWACS wing. Additional maintenance hangars, maintenance docks, hydrant fueling systems, and airmen dormitories are a few of the major facilities required. The estimated aggregate cost for the MOB facilities is $25M which excludes the purchase of real estate to construct the facilities. The estimated aggregate cost for constructing new depot facilities and purchasing depot maintenance production equipment will be in excess of $100M.

Environmental Impact.

(1) The weather is generally good for most flying operations. The summer, May through September, is characteristically hot and dry with almost continuously clear skies. However, winter weather, November through March, is generally damp and cool with low ceilings and visibilities due to stratus clouds and fog. These conditions, low ceilings and fog, often prevail for extended periods with very little relief during the day. Generally, during two to four days of the year there is a high meteorological potential for air pollution.

(2) The airspace utilization in the Sacramento area is presently divided between four major users. McClellan AFB is located about 10 miles east of Sacramento Metropolitan Airport. Approximately 8 miles to the southeast is Mather AFB, and 10 miles to the south is Sacramento Executive Airport. All of these airports, civil and military, have a considerable volume of air traffic. Flight patterns and profiles are very closely coordinated with all users of the Sacramento airspace, and a change in a pattern at one location would probably affect the operations of another. However, it is felt that air traffic control facilities are sufficient to handle the increase in air traffic which would be a part of the AWACS mission. Headquarters USAF recently established a General Officer Panel on Midair Collision Potential. Based upon this Panel's findings, McClellan AFB has been identified as a base requiring priority action to reduce midair collision potential to a practicable minimum.

(3) The AWACS operations would be in addition to the current flight test operations of the overhauled F/FB-111s, F-105s, F-106s, and in the future, A-10s; and flight operations of the following units: 552d Airborne Early Warning and Control Group (EC-121s), 940th Tactical Airlift Group (AFRES) (C-130s), 41st Aerospace Rescue and Recovery Sq (C-130s and helicopters) and the 55th Weather Reconnaissance Sq (C-130s and C-135s). Within the Sacramento Valley Air Pollution Control Region, the addition of the AWACS mission will increase total Region emissions by the following percentages:

Carbon Monoxide	0.10%
Oxides of Nitrogen	0.39%
Oxides of Sulfur	0.68%
Hydrocarbons	0.35%
Particulates	0.05%

(4) Present base operations at McClellan exceed hydrocarbon emissions standards. The increased flying activity related to the AWACS beddown would cause the base to further exceed this standard if corrective measures were not taken. The State of California is presently monitoring all stationary sources at McClellan to determine compliance with standards for the other pollutants.

(5) Current aircraft operations at McClellan generate approximately 221 take offs, landings, and go-arounds daily. Introduction of AWACS would increase this total by 62 operations per day (i.e., 283 take offs, landings, and go-arounds daily). This is a 22 percent increase in the total flying operations at McClellan. With this increase in activity, additional land areas would be exposed to aircraft noise. McClellan AFB presently prohibits low approaches, touch and go landings or full stop taxi-back landings from 2200 to 0600 local time. Engine runups and take offs during night hours (2200-0600 local) are restricted to mission essential operations to reduce noise impact. The addition of the AWACS mission at McClellan would further degrade the residential environment, particularly in areas south of the base. Compatible land use controls are currently needed to prevent further deterioration.

(6) Based on current TAC population figures, an average of 65 percent of assigned personnel are married. With the projected manning for AWACS of 3512, the family housing requirement would be 2282 units. Based on the information in the latest McClellan AFB housing referral survey, an abundance of housing is available in the immediate area. However, due to the level of rental rates, married airmen of grades E-4 and E-5 may find it very difficult to rent an adequate house.

(7) Based on the projected manning of 3512, the estimated increase in dependent population would be 4200. Of this number, approximately 950 would be school age children that would impose an additional demand on the local public school system. School age children residing on McClellan AFB and in the surrounding communities would attend Sacramento County Schools. Public school enrollment for the 1974-75 school year was 160,688 students in a system with a maximum capacity of some 190,000 students. An increase of 600 students does not appear to be a burden on the present school system.

(8) The influx of personnel to operate and maintain the AWACS would create an increase in demand for potable water and sanitary sewage treatment. Water is provided by on-base wells which draw from an acquifer that has been rated satisfactory beyond year 2000 by the U.S. Geologic Survey. The

average daily demand is 3.13 million gallons and the system can easily handle a 6 million gallon daily demand. Both sanitary and industrial waste are treated by base sewage systems. The sanitary system is operating at 60 percent of capacity and could treat the increased waste generated as a result of the beddown of the mission.

SUMMARY. The mitigating factors against locating the AWACS MOB at McClellan AFB make this base one of the least desirable for the following reasons: (1) There are no engine and airframe depot maintenance capabilities for the AWACS weapon system, thus ferrying the AWACS aircraft would be required. (2) MCP cost for the depot functions would be in excess of $100M. (3) This base does not provide the optimum location within the CONUS for both European and Pacific contingency deployments. (4) The noise impact on residential areas could create adverse reactions.

ROBINS AFB, GEORGIA:

Depot and Intermediate Maintenance Facilities. This criterion is only partially met since it would still be necessary to ferry AWACS aircraft to Tinker AFB for engine and airframe maintenance. Duplication of the Tinker depot maintenance facilities at Robins is not practical due to the prohibitive cost. The Warner Robins ALC has a threefold mission: It is the world-wide logistics manager for most of the Air Force's transport aircraft (C-141, C-130, C-7), all Air Force helicopters, the F-15 air superiority fighter, two reconnaissance bombers (B-57, B-66) among other aircraft. The ALC serves as a storage center at wholesale and retail levels for Air Force spare parts and systems. And finally, the ALC is the exclusive technology repair center for airborne electronics for the Air Force and will have depot maintenance responsibilities for the AWACS' rotodome radar and its associated electronics equipment.

Employment/Deployment Considerations. AWACS beddown at Robins AFB does not provide the optimum location within the CONUS, for both European and Pacific contingency deployments. Using a ground speed of 450 knots either way, Robins AFB is 1870 NM or 4 hours and 9 minutes flying time to the West Coast and 170 NM or 23 minutes to the East Coast.

Minimum Facility Deficiencies/MCP Costs. This base has sufficient existing permanent buildings, plants and systems to support its current and projected ALC workloads for several years. Approximately $75M of new construction is included in the MCP

for the next five years to update temporary and semi-permanent buildings. Additional major facility construction would be required at Robins to support the AWACS wing. Additional operational apron, squadron operations, flight simulator, maintenance hangar, corrosion control, fuel system dock and bachelor living facilities are a few of the major facilities that would be required. The estimated aggregate cost for the MOB facilities is $29M. The estimated aggregate cost for constructing new depot facilities and purchasing depot maintenance production equipment will be in excess of $100M.

Environmental Impact.

(1) Weather is good and will not constrain the flying activities of an AWACS wing. Contact flying conditions prevail at the base 90 percent of the time, instrument conditions 6 percent and the field is closed to flying because of fog approximately 1 percent and for weather and other causes about 4 percent of the time. Only on a few occasions, when prolonged winds from the northeast are experienced, has visibility been reduced to two miles because of a haze caused by air pollution.

(2) Due to the geographical separation of Robins in relation to high density areas such as the Atlanta Traffic Control Area, the enroute system (Atlanta Air Traffic Regional Control Center) is easily able to absorb Robins traffic without adverse impact. The Approach Control procedures and manning levels are to a large extent predicated on Robins traffic and the system is designed to be flexible and accommodate varying levels of traffic and mission changes without significant impact. Headquarters USAF recently established a General Officer Panel on Midair Collision Potential. Based upon the Panel's findings, Robins AFB has been identified as a base requiring priority action to reduce midair collision potential to a practicable minimum.

(3) AWACS operations at Robins AFB would be in addition to required flight tests, 19th Bombardment Wing and other transient operations. As a source category within the Central Georgia Air Quality Control Region, Robins AFB has an impact on the overall air quality.

Carbon Monoxide	0.14%
Oxides of Nitrogen	0.02%
Oxides of Sulfur	0.06%
Hydrocarbons	0.86%
Particulates	0.64%

(4) Measured concentrations for particulates were in excess of the maximum amounts permissible under existing standards 10 percent of the time since 1972. Upon completion of the AWACS beddown, there will be an increase in the number of times this standard for particulates is exceeded. None of the other pollutants exceed standards.

(5) Current aircraft operations at Robins AFB generate about 300 operations (take offs, landings, and go-arounds) daily. Introduction of AWACS would increase operations to 362 per day, or a 17 percent increase. With this increase in activity, there would be a slight increase in the noise levels. Except for an area north of the base, there are no urban or airspace encroachment problems currently, or anticipated in the foreseeable future. The impact of the AWACS operations will be noticeable to the inhabitants of single family units north of the base. The proposed expanded clear zone acquisition and incorporation of the Air Installation Compatible Use Zone Policies should provide for compatible future use.

(6) Based on current TAC population statistics, an average of 65 percent of assigned personnel are married. With the projected manning for AWACS of 3512 , the housing requirement is approximately 2282 units. The most recent housing referral survey shows 4560 units available in the vicinity of the base. This indicates that all assigned personnel could be accommodated, however, in order to provide an acceptable selection, efforts to initiate new housing starts should be undertaken immediately. Also, housing rental rates have been increasing rapidly which adds to the need for a greater selection.

(7) The influx of personnel to operate and maintain the AWACS would create an increase in the demand for potable water and sanitary sewage treatment. The base water supply is provided by a well field on base with an average demand of 4,111,500 GPD and a pumping capacity of 6,100,000 GPD. The expansion capability of the on-base water system is limited due to the requirement of additional water storage facilities. These would have to be built during the mission phase-in period. Sanitary sewage is treated by base facilities and contract with the city of Warner Robins. Increases in treatment requirements could be handled through the contract with Warner Robins.

(8) Based on the projected manning of 3512 , the estimated increase in dependent population would be approximately 4200 . Of this number, approximately 950 would be school age children that would impose an additional demand on the local public

school system. Houston County schools have recently switched to a quarter system which increases their overall capacity. The classrooms are considered full, but not crowded. Expansion of play areas and academic classrooms is underway at several schools within the region of influence. Most schools in the region have plans for expansion as demand requires, so the mission impact should not be significant.

Summary. The mitigating factors against locating the AWACS MOB at Robins AFB make this base less desirable for the following reasons: (1) There are no depot maintenance capabilities for the AWACS weapon system, thus ferrying the AWACS aircraft would be required for engine and airframe type depot maintenance. (2) This base does not provide the optimum location within the CONUS for both European and Pacific contingency deployments. (3) MCP costs for the MOB would be approximately \$29M and for the depot functions in excess of \$100M. (4) Housing starts must be immediately undertaken to provide an adequate selection for personnel assigned with this mission.

TINKER AFB, OKLAHOMA:

Depot and Intermediate Maintenance Facilities. This criterion is fully met since Tinker has both depot and intermediate level maintenance capability. Currently, the Oklahoma City ALC is divided into three principal areas: logistics support management, technical and engineering, and industrial. The ALC is logistics support manager for almost all of SAC's bomber and tanker fleet and manages a substantial portion of the engines in the Air Force inventory. Essentially, these are engines manufactured by General Electric, Pratt and Whitney, and Allison, and include such modern engines as the J-57, J-75, TF-30, TF-33, TF-41, and F-101. The AWACS aircraft will use the TF-33-PW 100-A engine which can be easily integrated into the current depot mission at Tinker. The ALC's technical and engineering capability is vital to the maintenance of a first rate up-to-date Air Force. As an industrial facility, the Oklahoma City ALC operates a large overhaul and modification complex engaged in repairing and upgrading aircraft, a vast quantity of engines, and many thousands of accessory items.

Employment/Deployment Considerations. AWACS beddown at Tinker AFB provides an optimum geographical location for both European and Pacific contingency deployments. Using a ground speed of 450 knots one way, Tinker is 1200 NM or 2 hours and 40 minutes flying time from the West Coast and 1060 NM or 2 hours and 21 minutes flying time from the East Coast.

Minimum Facility Deficiencies/MCP Costs. This base has sufficient existing permanent buildings, plants, and systems to support its current and projected ALC workloads for several years. However, to accept another major mission such as the AWACS, extensive facility construction would be required. To construct the necessary facilities for the MOB, the cost would be approximately $26.7M. There would be no added depot costs since the AWACS depot maintenance requirements can be integrated within the current depot mission at Tinker.

Environmental Impact.

(1) Weather is good and would not constrain the flying activities of an AWACS wing. The ceiling is greater than 200 feet and visibility greater than one-half mile over 98.5 percent of the time. Generally, during less than one day of the year is there a high meteorological potential for air pollution.

(2) There would be minimal impact on air traffic control. The programmed expansion of the Oklahoma City Approach and Departure Control is estimated to be adequate to accommodate the increased Tinker activity that would result from the AWACS mission.

(3) AWACS operations at Tinker AFB would be in addition to the current depot level flight testing of the A-7, B-52, C-135, and C-137 aircraft as they complete their overhaul cycle. Additionally, the Air Force Reserves' 465 Tactical Fighter Squadron (F-105s) conducts daily flying operations. Consequently, there would be an increase in aircraft emissions. Local industry, as well as Tinker, utilizes natural gas for most heating processes; therefore, additional emissions from new facilities to support AWACS would not be significant. Hydrocarbon and particulates levels are currently above the primary ambient standard. Introducing AWACS into the Central Oklahoma Air Quality Control Region would increase total Region emissions by the following percentages:

Carbon Monoxide	0.10%
Oxides of Nitrogen	0.40%
Oxides of Sulfur	0.30%
Hydrocarbons	0.50%
Particulates	0.40%

Increases in particulates and hydrocarbon emissions can be expected to aggravate concern over particulate standards and the formation of photochemical oxidants.

(4) Current aircraft operations at Tinker generate approximately 228 operations (take offs, landings, and go-arounds) daily. Introduction of the AWACS mission would increase this total by 62 operations per day, a 22 percent increase in the total flying operations. This increase in flying activity would generate additional noise which would impact the property adjacent to the base. However, as a result of the initiative of the local government and property owners, the area which would receive the greatest impact has been cleared of residents. In addition, a proposal for land use controls in the Tinker AFB environs will be presented to the local governments to reduce future incompatible growth near the base. The surrounding communities have been extremely cooperative in initiating and enforcing zoning laws to guard against encroachment.

(5) Based on current TAC population statistics, an average of 65 percent of assigned personnel are married. With the projected manning for AWACS of 3512 , the family housing requirement would be 2282 units. A detailed housing survey is being made at Tinker AFB to determine if additional housing construction would be required.

(6) The influx of personnel to operate and maintain the AWACS would increase the demand for potable water and sanitary sewage treatment. Potable water is provided by a USAF operated well field located on Tinker. There is sufficient capacity to accommodate the possible increase in demand. Sewage is treated by the surrounding community treatment plants and their capacity is adequate to accept the increased volume.

(7) Based on the projected manning of 3512 . the estimated increase in dependent population would be approximately 4200 . Of this number approximately 950 would be school age children that would impose an additional demand on the local public school system. The public schools in the immediate vicinity of the base are operating at close to capacity levels. Therefore, depending on where the assigned personnel actually locate, rapid expansion of some school facilities will be required.

Summary. After considering the pros and cons relative to each of the criteria, Tinker AFB has been identified as one of the leading candidates for the AWACS MOB.

5.3.3 SUMMARY OF CANDIDATES

Tinker AFB ranks first in comparison to the other bases when total consideration is given to all the criteria used in selecting the AWACS MOB:

Currently, Tinker has the depot facilities and production equipment that will permit integration of the AWACS engine and airframe maintenance requirements into current maintenance activities. At all other alternative bases except Kelly AFB the AWACS aircraft would have to be ferried to Tinker for depot level engine and airframe maintenance. Kelly currently has the facilities for engine and airframe maintenance for similar type aircraft but would require modification and additional production equipment to accept the AWACS weapon system (estimated cost will exceed $50M).

Tinker and Kelly represent the optimum locations for AWACS basing with respect to deployments to both the European theater and Pacific deployments. Tinker has an advantage during the AWACS Air Defense role when deploying along the most likely enemy air approach routes to North America.

In reference to overall cost effectiveness, locating the MOB at Tinker results in greater life cycle-cost savings for the following reasons:

(1) The one-of-a kind nature of AWACS makes logistics support (organizational, intermediate, and depot maintenance, supply, AGE, etc.) more economical due to the fact that this capability is currently available at Tinker. Locating the MOB at another location would result in duplication of supply accounts, aerospace ground equipment (AGE), and associated logistics support.

(2) Necessary depot facilities and production equipment, which are required to support the AWACS, are presently in place at Tinker. Therefore, no extra expense would be required to build depot facilities and purchase the production equipment.

(3) If the MOB is located other than at Tinker and considering that the cost to provide facilities and production equipment at Kelly AFB is excessive, the AWACS aircraft would have to be flown to Tinker for engine and airframe depot maintenance. The ferrying expenses would result in a costly operation over the life of the AWACS weapon system. Substantial cost avoidance in fuel and manhours, as well as enhanced readiness, would be realized by eliminating the ferrying operations.

There seems to be no really controversial environmental impact at any of the alternative bases:

(1) There is little difference when comparing weather characteristics of the five alternatives to the desired weather criteria. Tinker, as do the other bases, with the possible exception of Hill and McClellan, has good weather for all types of flight operations.

(2) Based upon recent findings of the General Officer Panel on Midair Collision Potential, Tinker AFB is the only alternative base for the AWACS MOB that was not identified as a base requiring priority action to reduce midair collision potential.

(3) The nature of the combustion process and the size of the engines powering the AWACS will result in an increase in pollutants emitted at all the bases considered. The degree of increase will be related to the magnitude of the existing mission in relation to the AWACS mission.

(4) Increases in land area subjected to adverse noise levels would occur at all locations. Some impact on land use can be expected as rezoning may be required to insure future compatible use of nearby land. None of the areas would suffer severe impacts from the lack of potable water; however, Robins AFB would be most affected. In addition, sewage treatment capability is sufficient at all locations. Educational facilities for dependents will not be a major problem; however, facility expansions requirements would be more pronounced at Hill, Kelly and Robins AFBs. Some of the installations will have on-basing housing shortages but, generally, housing is available in the surrounding areas.

The following subjective matrix rating the bases as good, fair, or poor summarizes the selection considerations:

ALTERNATIVE BASES	MAINTENANCE CAPABILITY	LOCATION	FACILITY COST (APPROX)	DEPOT FACILITY/ EQUIPMENT COST (IN EXCESS)
Hill	Poor	Poor	$45M	$100M
Kelly	Fair	Good	$30M	$ 50M
McClellan	Poor	Poor	$25M	$100M
Robins	Poor	Poor	$29M	$100M
Tinker	Good	Good	$27M	-0-

ALTERNATIVE BASES (CONTINUED)	ENVIRONMENTAL CONSIDERATIONS					
	WEA	AIR TRAF	AIR POLL	AICUZ/ NOISE	HOUSING	WATER/ SEWAGE	SCHOOL
Hill	Fair	Good	Poor	Fair	Good	Good	Poor
Kelly	Good	Good	Poor	Fair	Good	Good	Fair
McClellan	Fair	Good	Poor	Poor	Fair	Good	Good
Robins	Good	Good	Poor	Good	Fair	Fair/ Good	Fair
Tinker	Good	Good	Poor	Fair	Fair	Good	Good

5.4 CONCLUSION

The proposal to select Tinker AFB for the beddown of the first AWACS operational wing is heavily influenced by its depot level maintenance capability, its central location for deployments to all theaters, and its overall cost effectiveness. In the Air Defense posture Tinker provides an ideal location for launch to all areas of the CONUS. Weather conditions are excellent and airspace suitable for training operations is readily available. The above factors are felt to outweigh the less favorable aspects of the Tinker AFB selection when considering environmental impacts and the facility costs.

6.0 ADVERSE IMPACTS WHICH CANNOT BE AVOIDED

The beddown of the AWACS aircraft at Tinker AFB represents a significant change in aircraft operations. Resulting from this action will be changes in the environment as it exists today. Those considered adverse and unavoidable are summarized here.

The addition of the E-3A aircraft will result in an increase in the total daily number of flight operations by approximately 17 percent. The increase in daily runup activity will be about five percent. Noise level determinations of the E-3A during operation have not been carried out to date but it has been assumed that the noise data for the E-3A will be the same as that of the C-141 aircraft.

The population and land area exposed to adverse noise levels will increase due to the AWACS beddown, primarily due to this increase in the number of operations and runup activity. The population severely impacted will increase by about 70 percent, while the number of dwellings within incompatible areas increase by about 135 percent. For less severe impact, defined as within the Ldn 65 and 75 dB contours, both the population impacted and the number of dwellings will increase by about 10 percent.

The beddown of the "AWACS" at Tinker AFB will result in the following two major changes in pollutant emissions at the base:

(1) an increase in total emissions of hydrocarbons in the Central Oklahoma Air Quality Control Region of about 0.5 percent.

(2) an increase in total emissions of particulates in the Region of about 0.4 percent.

The total contribution by the base to regional emissions is expected to remain generally in the 1 to 3 percent range for all pollutant classes. The increase in HC and particulate emissions is considered significant because of the excessive concentrations of photochemical oxidants (hydrocarbons being precursors to photochemical oxidants) and particulates that already exist in the Region. The increase in HC and particulate emissions can be expected to impede to some degree efforts to control concentrations of these pollutants in the Region. Increases in emissions or other pollutant classes will not result in an adverse impact.

Vehicular emissions are expected to decrease in that the number of personnel at Tinker AFB in 1978 will only be slightly greater than the current situation and cars with improved emission controls will be replacing some cars currently in use. There will only be a slight increase in the number of vehicle miles driven on base and a probable reduction in HC, CO and NO_x emissions.

The potential for aircraft accidents will always exist. The accident hazard zones defined by the AICUZ methodology for the proposed AWACS mission at Tinker are the same as those for the present mission.

The alteration and construction of facilities which will support the AWACS mission will cause localized short-term adverse impacts such as construction noise, dusting, possible erosion, minor traffic congestion and unsightliness.

7.0 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

The beddown of a new operational wing of the E-3A "AWACS" aircraft at Tinker AFB, Oklahoma, will require alterations and rehabilitation of existing structures and construction of new facilities including family housing, as described in Section 2.7, representing a total expenditure of $36,700,000. Materials and labor devoted to this construction program are considered to be irretrievably committed.

Land used as construction sites for new aircraft operational related structures and runway improvement represent a long-term commitment, although the new construction will take place in areas of the base in which the existing land use is aircraft-operation related. Military family housing is sited in an area whose present use is residential. Also, associated with the construction activities will be the removal of top toil, which is considered to be irretrievably lost from the construction site.

Energy utilization in the form of fuel products, lubricants, electricity and natural gas will be increased 54% over present levels as discussed in Section 4.8.

8.0 THE SHORT-TERM USES OF MAN'S ENVIRONMENT VERSUS THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

The beddown of the new AWACS wing at Tinker AFB is not inconsistent with actions of the past on the mission of Tinker as an integral component of air national defense.

Nonetheless, the introduction of the new E-3A aircraft in the Oklahoma City, Midwest and Del Cities area represent a significant change in aircraft operational characteristics under conditions of maximum aircraft operations. This will result in adverse impacts to a greater population currently affected by noise and accident hazard associated with aircraft presently utilizing Tinker AFB.

The community has, since the opening of Tinker in 1941, displayed an active interest in compatible community developments in the airport environs. Given this past trend, it is expected and hoped that future development in the area, particularly in areas south of Tinker, is planned and implemented based upon sound airport planning principles.

The Air Force recognizes its responsibilities for guiding the development of areas adjacent to air bases as being co-equal to that of community zoning commissions whose actions permit or prohibit all development under their jurisdictions.

The concept of AICUZ has been developed and applied according to present and anticipated operations at Tinker. AICUZ contours are presented in this CEIS in hopes of guiding local planning staff and zoning commissions in achieving compatible land use in the vicinity of Tinker AFB.

So long as aircraft operate from Tinker's runways, noise and air pollution and the potential threat of accidents will affect the environment of the people of the eastern metropolitan Oklahoma City area (principally Midwest City), as well as the military and civilian inhabitants and employees of the air base. The residents of metropolitan Oklahoma City have clearly accepted these facts of life along with the recognition of the many social and economic benefits which accompany Tinker's presence in the area.

9.0 CONSIDERATIONS THAT OFFSET THE ADVERSE ENVIRONMENTAL EFFECTS

Tinker Air Force Base had always had a positive relationship with its surrounding communities. The local citizens continue to indicate their desire to have Tinker remain as an active Air Force Installation through passage of the Oklahoma County-wide bond issue for acquisition and clearance of the Glenwood Addition, a housing development beneath the north approach to the main runway (17/35). Clearing this land reduces severity of potential accidents and noise impact which helps insure continued base operations. This spirit of cooperation and support for Tinker AFB and its missions help offset any environmental degradation which may occur as a result of the AWACS beddown.

In addition to the general support for Tinker AFB, the increased economic activity that will accompany the AWACS beddown will help offset its negative impacts. Construction, housing sales, retail business and other commercial and service establishments will benefit from the increase in the number of base personnel assigned with the AWACS mission. This increase will more than offset the decrease in economic activity which will result from the overall reduction in civilian employment opportunities at Tinker due to imposed Congressional limitations on the size of the Air Force work force. The loss of 1785 civilian positions over the next five years, because of these reductions, would have an impact on the local economy. However, balancing this reduction with the personnel increase associated with AWACS will provide an overall economic gain for the region.

Another consideration is the importance of the AWACS mission in the defense of this nation, or support of military actions in other parts of the world. Its contribution to national security and deterrence of agression, though difficult to measure, must not be under-estimated. Achievement of the U.S. defense objectives will be enhanced since this new system will allow positive command and control of forces during a conflict. Realization of the systems potential has resulted in approval of the initial purchase of 10 E-3A's. Upon delivery of the total compliment of aircraft the benefit of AWACS to the national welfare greatly outweighs the localized environmental impacts.

10. DETAILS OF UNRESOLVED ISSUES

Following the 14 January 1976 public release of the Tinker AFB Air Installation Compatible Use Zone (AICUZ) study, which depicted the combined noise and accident potential impact of both the existing and the proposed AWACS missions, some citizen reaction occurred. This reaction primarily involved the proposed acquisition of the expanded clear zones. This acquisition requirement is based on existing operations and is not attributed to the AWACS proposal. A second issue was raised in March 1976 when Midwest City officials expressed their concern regarding the AWACS noise impact and related Air Force AICUZ land use reecommendations. Several meetings among Midwest City, Air Force and the Department of Housing and Urban Development officials were held to discuss the HUD position on this matter with regard to Federal Housing Administration Mortgage Insurance and HUD noise policy. Cooperative effects are underway to resolve potential Midwest City development problems.

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APPENDIX A

EMISSION INVENTORY

APPENDIX A. EMISSION INVENTORY

This appendix details the methodology and data used to prepare the emission inventory outlined in section 3.3.2.2. The location of each source is keyed to the designated base areas A, B, C, D, E, and "South 40." Area F has been added to include aircraft operational areas.

Tables A-1 through A-5 summarize the inventory calculations for 1974 and 1981. The total emissions of each pollutant are presented as are the emissions from each significant source. The percent contribution of each (1974) source and the 1974-1981 percent change in each source are also given.

Tables A-6 through A-12 summarize the calculations of emissions from aircraft engines. Data on engine emission rates used in these calculations were taken from the following sources:

1. AFWL Publication TR 73-199.

2. Cornell Aeronautical Laboratory Report NA5007-K-1.

3. Northern Research and Engineering Corp. Report 1167-1.

Tables A-13 through A-25 summarize the calculations of emissions from sources other than aircraft.

TABLE A-1

Carbon Monoxide Emission Summary

Source	Location	1974 Annual Emissions Kg/yr	Percent of Total 1974	1981 Annual Emissions Kg/yr	Percent Change
Aircraft					
Total Emissions	F	583×10^3		958×10^3	+ 64%
Ground Emissions	F	507×10^3	37%	855×10^3	+ 69%
Test Cells	C	282×10^3	21%	282×10^3	0
Run Up Stands	F	48.2×10^3	3.5%	65.6×10^3	+ 36%
AGE	F	9.17×10^3	.7%	37.6×10^3	+ 310%
Diesel Fuel Combustion	A-South 40	22.5×10^3	1.6%	22.5×10^3	0*
Heating Units					
Bldg. 3001	C	10.8×10^3	.8%	10.8×10^3	0
Bldg. 208	A	5.94×10^3	.4%	5.94×10^3	0
Bldg. 2102	B	1.23×10^3	<.1%	1.23×10^3	0
Bldg. 5802	E	1.30×10^3	<.1%	1.30×10^3	0
Bldg. 4007	D	$.199 \times 10^3$	<.1%	$.199 \times 10^3$	0
Other	A-South 40	1.06×10^3	<.1%	1.06×10^3	0
Vehicular Emissions	A-South 40	446×10^3	33%	181×10^3	-59%
Training Fires	F	33.3×10^3	2.4%	33.3×10^3	0
	GROUND Total	1.37×10^6	100%	1.50×10^6	+9.5%
	TOTAL Total	1.44×10^6		1.60×10^6	+11 %

*Additional Diesel Emissions from AGE Included in AGE Emissions.

TABLE A-2

Total Hydrocarbon Emission Summary

Source	Location	1974 Annual Emissions Kg/yr	Percent of Total 1974	1981 Annual Emissions Kg/yr	Percent Change
Aircraft					
Total Emissions	F	332×10^3		659×10^3	+98%
Ground Emissions	F	306×10^3	25%	625×10^3	+105%
Test Cells	C	357×10^3	30%	357×10^3	0
Run Up Stands	F	42.3×10^3	3.5%	57.6×10^3	+36%
AGE	F	41.1×10^3	3.4%	65.2×10^3	+ 59%
Diesel Fuel Combustion	A-South 40	3.7×10^3	.3%	3.7×10^3	0*
Heating Units					
Bldg. 3001	C	2.21×10^3	.2%	2.21×10^3	0
Bldg. 208	A	1.35×10^3	.1%	1.35×10^3	0
Bldg. 2102	B	$.255 \times 10^3$	<.1%	$.255 \times 10^3$	0
Bldg. 5802	E	$.228 \times 10^3$	<.1%	$.228 \times 10^3$	0
Bldg. 4007	D	$.047 \times 10^3$	<.1%	$.047 \times 10^3$	0
Other	A-South 40	$.418 \times 10^3$	<.1%	$.418 \times 10^3$	0
Vehicular Emissions	A-South 40	63.5×10^3	5.2%	25.4×10^3	-60%
Training Fires	F	19.0×10^3	1.6%	19.0×10^3	0

*Additional Diesel Consumption for AGE Included in AGE Emissions.

TABLE A-2 (Cont'd)

Total Hydrocarbon Emission Summary

Source	Location	1974 Annual Emissions Kg/yr	Percent of Total 1974	1981 Annual Emissions Kg/yr	Percent Change
Industrial Emissions	A	86.4×10^3	7.1%	86.4×10^3	0
	B	24.0×10^3	2.0%	24.0×10^3	0
	C	64.6×10^3	5.3%	64.6×10^3	0
	E	$.392 \times 10^3$	<.1%	$.392 \times 10^3$	0
Fuel Spills	F	20.1×10^3	1.6%	22.0×10^3	+ 9.4%
Fuel Storage					
JP4	A	48.9×10^3	4.0%	54.1×10^3	+ 11%
	B	$.035 \times 10^3$	<.1%	$.035 \times 10^3$	0
	C	11.5×10^3	1.0%	11.5×10^3	0
	South 40	$.096 \times 10^3$	<.1%	$.096 \times 10^3$	0
Avgas	A	14.0×10^3	1.2%	14.0×10^3	0
	C	8.38×10^3	.7%	8.38×10^3	0
Mogas	A	19.5×10^3	1.6%	21.3×10^3	+ 9.2%
	B	2.86×10^3	2.4%	2.86×10^3	0
	C	$.546 \times 10^3$	<.1%	$.546 \times 10^3$	0
	D	$.098 \times 10^3$	<.1%	$.098 \times 10^3$	0
	South 40	$.821 \times 10^3$	<.1%	$.821 \times 10^3$	0
Diesel	A	$.058 \times 10^3$	<.1%	$.058 \times 10^3$	0
	B	$.020 \times 10^3$	<.1%	$.020 \times 10^3$	0
	C	$.144 \times 10^3$	<.1%	$.275 \times 10^3$	+ 91%
	D	$.097 \times 10^3$	<.1%	$.097 \times 10^3$	0
	E	$.002 \times 10^3$	<.1%	$.002 \times 10^3$	0
	South 40	$.057 \times 10^3$	<.1%	$.057 \times 10^3$	0

TABLE A-2 (Cont'd)

Total Hydrocarbon Emission Summary

Source	Location	1974 Annual Emissions Kg/yr	Percent of Total 1974	1981 Annual Emissions Kg/yr	Percent Change
Fuel Storage (cont'd)					
Fuel Oil	A	1.45×10^3	.1%	1.45×10^3	0
	B	$.174 \times 10^3$	<.1%	$.174 \times 10^3$	0
	C	1.79×10^3	.1%	1.79×10^3	
	D	$.121 \times 10^3$	<.1%	$.121 \times 10^3$	0
	E	$.086 \times 10^3$	<.1%	$.086 \times 10^3$	0
Solvent	A	$.346 \times 10^3$	<.1%	$.346 \times 10^3$	0
	C	$.675 \times 10^3$	<.1%	$.675 \times 10^3$	0
Methyl Alcohol	A	$.110 \times 10^3$	<.1%	$.110 \times 10^3$	0
Tank Trucks					
JP4	F	15.9×10^3	1.3%	15.9×10^3	0
Avgas	F	2.25×10^3	.2%	2.25×10^3	0
Mogas	A-F	2.90×10^3	.2%	2.90×10^3	0
Diesel	A-F	$.026 \times 10^3$	<.1%	$.106 \times 10^3$	+ 308%
Aircraft Refueling	F	31.3×10^3	2.6%	60.7×10^3	+ 94%
Vehicle Refueling	A	14.4×10^3	1.2%	16.3×10^3	+ 13.0
	GROUND Total	1.21×10^6	100%	1.57×10^6	+ 30%
	TOTAL Total	1.24×10^6		1.61×10^6	+ 30%

TABLE A-3

Nitrogen Oxide Emission Summary

Source	Location	1974 Annual Emissions Kg/yr	Percent of Total 1974	1981 Annual Emissions Kg/yr	Percent Change
Aircraft					
Total Emissions	F	217×10^3		481×10^3	+ 122%
Ground Emissions	F	79.4×10^3	11%	91.4×10^3	+15%
Test Cells	C	265×10^3	36%	265×10^3	0
Run Up Stands	F	33.8×10^3	4.5%	41.2×10^3	+ 22%
AGE	F	2.68×10^3	.4%	23.0×10^3	+ 758%
Diesel Fuel Combustion	A-South 40	37.0×10^3	5.0%	37.0×10^3	0*
Heating Units					
Bldg. 3001	C	148×10^3	20%	148×10^3	0
Bldg. 208	A	83.2×10^3	11%	83.2×10^3	0
Bldg. 2102	B	16.9×10^3	2.3%	16.9×10^3	0
Bldg. 5802	E	14.8×10^3	2.0%	14.8×10^3	0
Bldg. 4007	D	2.80×10^3	.4%	2.80×10^3	0
Other	A-South 40	6.27×10^3	.8%	6.27×10^3	0
Vehicular Emissions	A-South 40	54.3×10^3	7.3%	33.5×10^3	- 38%
Training Fires	F	$.247 \times 10^3$	<.1%	$.247 \times 10^3$	0
	GROUND Total	744×10^3	100%	763×10^3	+ 2.6%
	TOTAL Total	882×10^3		1.15×10^4	+ 30%

*Additional Diesel Consumption for AGE Included in AGE Emissions.

TABLE A-4

Particulate Emission Summary

Source	Location	1974 Annual Emissions Kg/yr	Percent of Total 1974	1981 Annual Emissions Kg/yr	Percent Change
Aircraft					
Total Emissions	F	16.5×10^3		42.0×10^3	+154%
Ground Emissions	F	7.13×10^3	8.8%	8.52×10^3	+ 19%
Test Cells	C	24.3×10^3	30%	24.3×10^3	0
Run Up Stands	F	4.05×10^3	5.0%	4.81×10^3	+ 19%
AGE	F	9.17×10^3	11.3%	29.6×10^3	+ 223%
Diesel Fuel Combustion	A-South 40	1.30×10^3	1.6%	1.30×10^3	0*
Heating Units					
Bldg. 3001	C	10.7×10^3	13%	10.7×10^3	0
Bldg. 208	A	6.58×10^3	8.1%	6.58×10^3	0
Bldg. 2102	B	1.24×10^3	1.5%	1.24×10^3	0
Bldg. 5802	E	1.11×10^3	1.4%	1.11×10^3	0
Bldg. 4007	D	$.229 \times 10^3$	.3%	$.229 \times 10^3$	0
Other	A-South 40	$.790 \times 10^3$	1.0%	$.790 \times 10^3$	0
Vehicular Emissions	A-South 40	5.78×10^3	7.1%	5.98×10^3	± 3.5%
Training Fires	F	7.61×10^3	9.4%	7.61×10^3	0
Industrial Emissions	C	1.1×10^3	1.4%	1.1×10^3	0
	GROUND Total	81.1×10^3	100%	104×10^3	+ 28%
	TOTAL Total	90.5×10^3		137×10^3	+ 51%

*Additional Diesel AGE Emissions Included Under AGE Emissions.

TABLE A-5

Sulfur Oxide Emission Summary

Source	Location	1974 Annual Emissions Kg/yr	Percent of Total 1974	1981 Annual Emissions Kg/yr	Percent Change
Aircraft					
Total Emissions	F	9.14×10^3		19.0×10^3	+108%
Ground Emissions	F	4.06×10^3	3.6%	5.45×10^3	+ 34%
Test Cells	C	9.99×10^3	8.9%	9.99×10^3	0
Run Up Stands	F	1.47×10^3	1.3%	1.78×10^3	+ 21%
AGE	F	$.539 \times 10^3$	.5%	4.66×10^3	+ 765%
Diesel Fuel Combustion	A-South 40	2.71×10^3	2.4%	2.71×10^3	0*
Heating Units					
Bldg. 3001	C	38.7×10^3	34%	38.7×10^3	0
Bldg. 208	A	41.2×10^3	37%	41.2×10^3	0
Bldg. 2102	B	4.83×10^3	4.3%	4.83×10^3	0
Bldg. 5802	E	5.14×10^3	4.6%	5.14×10^3	0
Bldg. 4007	D	1.65×10^3	1.5%	1.65×10^3	0
Other	A-South 40	$.031 \times 10^3$	<.1%	$.031 \times 10^3$	0
Vehicular Emissions	A-South 40	1.99×10^3	1.8%	2.06×10^3	+ 3.5%
Training Fires	F	$.024 \times 10^3$	<.1%	$.024 \times 10^3$	0
	GROUND Total	112×10^3	100%	118×10^3	+ 5.4%
	TOTAL Total	117×10^3		132×10^3	+ 13%

*Additional Diesel Consumption for AGE Included in AGE Emissions.

TABLE A-6

Aircraft Emissions - Carbon Monoxide

Aircraft	No. LTO/yr	Emissions/LTO Grams Ground/Total	No. Touch & Go/yr	Emissions/T&G Grams Ground/Total	Annual Emissions 1000 Kg/yr 1974 Ground	1974 Total	1981 Ground	1981 Total
A4	1196	10128/10641	0		12.1	12.7	12.1	12.7
A7	910	17347/18965	0		15.8	17.3	15.8	17.3
Other "A" Series	676	17347/18965	4082	0/1618	11.7	19.4	11.7	19.4
B707/C135	936	62165/80770	0		58.2	75.6	58.2	75.6
B52	260	76368/87828	234	0/11460	19.9	25.5	19.9	25.5
C/DC9	1742	4324/5884	0		7.53	10.2	7.53	10.2
C141	1248	87325/88991	624	0/1666	109	112	109	112
C5	260	63156/65959	156	0/2803	16.4	17.6	16.4	17.6
F4	1508	24392/25226	0		36.8	38.0	36.8	38.0
F105	4160	14571/15071	0		60.6	62.7	60.6	62.7
L188/L382	2074	4343/5589	0		9.01	11.6	9.01	11.6
Other F100 Series	962	14571/15071	1326	0/500	14.0	15.2	14.0	15.2
C-130	1696	8301/9396	1118	0/1095	9.93	11.7	9.93	11.7
T38	2782	25867/29126	3016	0/3259	72.0	90.9	72.0	90.9
T39	1716	31840/34161	1742	0/2321	54.6	62.7	54.6	62.7
E-3A	2033	170441/172417	12194	0/1976	0	0	347	375

TABLE A-7

Aircraft Emissions - Total Hydrocarbons

Aircraft	No. LTO/yr	Emissions/LTO Grams Ground/Total	No. Touch & GO/yr	Emissions/T&G Grams Ground/Total	Annual Emissions 1000 Kg/yr 1974 Ground	1974 Total	1981 Ground	1981 Total
A4	1196	3288/3309	0		3.93	3.95	3.93	3.95
A7	910	19807/19969	0		18.0	18.2	18.0	18.2
Other A7 Series	676	19807/19969	4082	0/162	13.4	14.2	13.4	14.2
B707/C135	936	62718/79439	0		58.7	74.4	58.7	74.4
B52	260	74385/77540	234	0/3155	19.3	20.9	19.3	20.9
C/DC9	1742	1048/1196	0		1.83	2.08	1.83	2.08
C141	1248	78138/78629	624	0/491	97.5	98.4	97.5	98.4
C5	260	21375/21739	156	0/364	5.56	5.71	5.56	5.71
F4	1508	2075/2141	0		3.13	3.23	3.13	3.23
F105	4160	10706/10779	0		44.5	44.8	44.5	44.8
L188/L382	2074	1890/2910	0		3.92	6.04	3.92	6.04
Other F100 Series	962	10706/10779	1326	0/72.7	10.3	10.5	10.3	10.5
C-130	1696	797/859	1118	0/61.6	.953	1.05	.953	1.05
T38	2782	7003/7609	3016	0/606	19.5	23.0	19.5	23.0
T39	1716	3142/3266	1742	0/124	5.39	5.82	5.39	5.82
E-3A	2033	157058/157570	12194	0/512	0	0	319	327

TABLE A-8

Aircraft Emissions - Nitrogen Oxides

Aircraft	No. LTO/yr	Emissions/LTO Grams Ground/Total	No. Touch & Go/yr	Emissions/T&G Grams Ground/Total	Annual Emissions 1000 Kg/yr 1974 Ground	1974 Total	1981 Ground	1981 Total
A4	1196	1373/3964	0		1.64	4.74	1.64	4.74
A7	910	668/2699	0		.608	2.46	.608	2.46
Other A7 Series	676	668/2699	4082	0/2031	.452	10.1	.452	10.1
B707/C135	936	2835/7108	0		2.65	6.65	2.65	6.65
B52	260	19528/32846	234	0/13318	5.08	11.7	5.08	11.7
C/DC9	1742	1444/6741	0		2.52	11.7	2.52	11.7
C141	1248	27879/47707	624	0/19828	34.8	71.9	34.8	71.9
C5	260	18886/75537	156	0/56651	4.91	28.5	4.91	28.5
F4	1508	2030/5522	0		3.06	8.33	3.06	8.33
F105	4160	3208/8065	0		13.3	33.6	13.3	33.6
L188/L382	2074	1704/2520	0		3.53	5.23	3.53	5.23
Other F100 Series	962	3208/8065	1326	0/4857	3.09	14.2	3.09	14.2
C-130	1696	198/484	1118	0/286	.237	.698	.237	.698
T38	2782	1021/1341	3016	0/320	2.84	4.70	2.84	4.70
T39	1716	398/952	1742	0/554	.683	2.60	.683	2.60
E-3A	2033	5913/23656	12194	0/17743	0	0	12.0	264

TABLE A-9

Aircraft Emissions - Particulates

Aircraft	No. LTO/yr	Emissions/LTO Grams Ground/Total	No. Touch & Go/yr	Emissions/T&G Grams Ground/Total	Annual Emissions 1000 Kg/yr 1974 Ground	1974 Total	1981 Ground	1981 Total
A4	1196	110/310	0		.132	.370	.132	.370
A7	910	84/261	0		.076	.238	.076	.238
Other A7 Series	676	84/261	4082	0/178	.057	.903	.057	.903
B707/C135	936	387/1065	0		.362	.997	.362	.997
B52	260	717/2732	234	0/2015	.186	1.18	.186	1.18
C/DC9	1742	68/231	0		.118	.402	.118	.402
C141	1248	2578/3354	624	0/776	3.22	4.67	3.22	4.67
C5	260	69/159	156	0/90	.018	.055	.018	.055
F4	1508	309/730	0		.466	1.10	.466	1.10
F105	4160	233/601	0		.969	2.50	.969	2.50
L188/L382	2074	446/720	0		.925	1.49	.925	1.49
Other F100 Series	962	233/601	1326	0/368	.224	1.07	.224	1.07
C-130	1696	35.2/87.3	1118	0/52.1	.042	.126	.042	.126
T38	2782	77/209	3016	0/132	.214	.980	.214	.980
T39	1716	72/171	1742	0/100	.124	.468	.124	.468
E-3A	2033	6121/2319	12194	0/1707	0	0	1.24	25.5

TABLE A-10

Aircraft Emissions - Sulfur Oxides

Aircraft	No. LTO/yr	Emissions/LTO Grams Ground/Total	No. Touch & Go/yr	Emissions/T&G Grams Ground/Total	Annual Emissions 1000 Kg/yr 1974 Ground	1974 Total	1981 Ground	1981 Total
A4	1196	75/179	0		.0897	.214	.0897	.214
A7	910	85/171	0		.0774	.156	.0774	.156
Other A7 Series	676	85/171	4082	65.8	.057	.384	.057	.384
B707/C135	936	46/308	0		.043	.288	.043	.288
B52	260	591/1324	234	0/733	.154	.516	.154	.516
C/DC9	1742	68/237	0		.118	.413	.118	.413
C141	1248	1225/1853	624	0/628	1.53	2.70	1.53	2.70
C5	260	660/1321	156	0/661	.172	.447	.172	.447
F4	1508	195/351	0		.294	.529	.294	.529
F105	4160	153/341	0		.636	1.42	.636	1.42
L188/L382	2074	99/169	0		.205	.351	.205	.251
Other F100 Series	962	153/341	1326	0/189	.147	.579	.147	.579
C-130	1696	52/108	1118	0/56	.062	.152	.062	.152
T38	2782	82/110	3016	0/28	.228	.390	.228	.390
T39	1716	144/246	1742	0/102	.247	.600	.247	.600
E-3A	2033	684/1281	12194	0/597	0	0	1.39	9.88

TABLE A-11

Test Cell Emissions 1974, 1981

Engine	Total Running Time/yr (hrs)	Total Emissions, 1000 Kg/yr				
		CO	HC	NOx	Part.	SOx
J-57	2706	83.0	292	37.3	4.97	1.82
TF-41	1654	30.4	19.9	38.6	3.8	1.10
J-75	520	18.2	7.57	99.7	5.93	2.72
J-79	551	24.5	1.53	19.7	.996	.842
TF-30	1875	86.8	2.83	50.5	6.54	2.74
TF-33	1575	39.2	33.2	19.3	2.06	.769
TOTAL	8881	282	357	265	24.3	9.99

TABLE A-12

Run Up Stand Emissions 1974, 1981

			Total Emissions, 1000 Kg/yr				
Aircraft	Number of Engines	Total Running Time/yr (Hrs)	CO	HC	NOx	Part.	SOx
B-52	8	834	23.2	18.5	27.7	3.57	1.16
C-135	4	209	2.6	2.41	.314	.053	.024
A7	1	720	22.0	21.2	2.94	.214	.197
F105	1	187	.407	.165	2.81	.215	.093
	Total 1974	1950	48.2	42.3	33.8	4.05	1.47
E-3A	4	442	17.4	15.4	7.40	.762	.301
	Total 1981	2392	65.6	57.6	41.2	4.81	1.78

TABLE A-13

Auxiliary Ground Equipment 1974-1981

AGE emissions are based on the fuel consumption of the AGE equipment. JP4 and Mogas are presently used by the AGE equipment. Current fuel consumption rates by each unit at TAFB are expected to continue through the AWACS beddown so that the AWACS AGE will increase the total fuel consumption and air emissions. In addition, some of the AWACS AGE will burn diesel fuel in addition to JP4 and Mogas.

Annual Fuel Consumption, Gallons, 1974

Unit	JP4	Mogas	Diesel
2854ABGp/MA	10,070	62,792	--
Maint. Directorate	28,026	225,047	--
507th	33,573	9,592	--
Total 1974	71,669	297,431	--

Emission Indices Kg/1000 lbs Fuel

Fuel	CO	HC	NOx	Part.	SOx
JP4	9.08	.908	1.82	9.08	.182
Mogas	2.90	24.5	1.09	2.9	.272
Diesel	15.3	2.52	25.2	.885	1.84

AWACS Fuel Consumption, Gallons per Year, 1981

Equipment	Total Time/ Sortie	JP4	Mogas	Diesel
Service Truck	27 hrs avg.		110×10^3	
-60 Turbine	3.75 hrs avg.	266×10^3		
MEP 116A Generator	7 hrs avg.			159×10^3
NF 2 light all	6.5 hrs avg.		19.8×10^3	
ACE 406-322 Air Cond.	3.5 hrs avg.			73.3×10^3
H-1 Heater	.5 hrs avg.		5.08×10^3	
Liquid cool cart.	1.25 hrs avg.			26.2×10^3
MAIA Compressor	.12 hrs avg.		$.366 \times 10^3$	
Hydraulic Test Stand.	.75 hrs avg.		6.86×10^3	
TOTAL		266×10^3	142×10^3	258×10^3

Total AGE Emissions 1000 Kg/yr

Year	CO	HC	NOx	Part.	SOx
1974	9.38	45.6	2.82	9.38	0.882
1981	53.2	72.9	50.2	28.4	4.29

TABLE A-14

Diesel Fuel Combustion Emissions 1974-1981

220,511 gallons of diesel fuel were consumed on Tinker AFB from November 1973 through October 1974. This fuel was burned in various internal combustion engines ranging from emergency generators to railroad locomotives. These sources of emissions are therefore spread out over most of the base and are considered representative of a typical year at Tinker AFB. These emissions are not expected to change significantly through 1981.

	Emissions	
Pollutant	Emission Factors(1) Kg/1000 gallons	Emissions/yr (10^3 Kg)
Carbon Monoxide	102	22.5
Hydrocarbons	16.8	3.70
Nitrogen Oxides	168	37.0
Particulates	5.90	1.30
Sulfur Oxides	12.3	2.71

(1) Source: U.S. Environmental Protection Agency, A.P.-42, Compilation of Air Pollutant Emission Factors, First Edition, Table 3-2, February 1972.

TABLE A-15

Heating Unit Emissions 1974-1981

95% of the natural gas and all the fuel oil are burned in 5 major steam plants on the base. The sixth plant burns natural gas only. These plants provide the industrial steam, office and domestic heating and cooling for the base. The other 5% of the natural gas is consumed in individual building heaters and hot water heaters.

Emission Factors (Kg)[1]

Fuel	CO	HC	NOx	Part.	SOx	
Natural gas - large boilers	7.7	1.4	104	6.8	.27	per 10^6 ft^3 of gas
Natural gas - small units	9.1	3.6	54	6.8	.27	
No. 2 Fuel Oil	1.8	1.4	36	6.8	161	per 10^3 gal of oil

Emissions/Year (1000 Kg/yr)

		Fuel Consumption		Total Emissions 10^3 Kg/yr				
Bldg.	Location	Nat. Gas (10^3 ft^3)	Fuel Oil (gal)	CO	HC	NOx	Part.	SOx
3001	C	1,341,590	238,246	10.8	2.21	148	10.7	38.7
208	A	711,982	254,989	5.94	1.35	83.2	6.58	41.2
2102	B	152,715	29,473	1.23	.255	16.9	1.24	4.83
5802	E	131,164	31,680	1.30	.228	14.8	1.11	5.14
1030	South 40	out of service	not used	--	--	--	--	--
4007	D	23,423	10,200	.199	.047	2.80	.229	1.65
Other		116,128	not used	1.06	.418	6.27	.790	.031

(1) Source: U.S. Environmental Protection Agency, AP-42, Compilation of Air Pollutant Emission Factors, Second Edition, April 1973 and Supplement No. 3, July, 1974.

TABLE A-16

VEHICULAR EMISSIONS

1974-1981

Vehicular emissions are based on the average number of miles driven on base per year. A traffic survey conducted in September 1966[1] counted the number of cars travelling on major roadways within the base. Multiplying these counts by the length of those roadways and estimating that these represent 80% of all the vehicle miles indicates that the average weekday vehicle mileage on base in 1966 was 59,682 vehicle miles. At that time, the total traffic volume through the base gates was 82,000 vehicles. In August, 1974, the total traffic through the gates was 50,560 vehicles. Traffic volume is directly proportional to vehicle mileage, so 1974 vehicle mileage = 59,682 x 50,560/82,000 = 36,799 vehicle miles per day (VMD). This level is representative of the 260 workdays per year. Weekend traffic is only 10% of weekday levels[2] so the total annual vehicle mileage in 1974 is [260 days x 36,799 VMD] + [.10 x 36,799 VMD x 105 days] = 9,954,142 vehicle miles per year in 1974. Mileage is proportional to base work force, so in 1981 it is projected to be 9,954,142 x 22137/21387 = 10,303,214 miles per year.

Vehicle Emissions

Emissions for each major pollutant are calculated by multiplying the national average vehicular emission factor (corrected to an average speed of 25 mph) by the number of vehicle miles travelled on base (AVM).

Pollutant	Emission Factor (2) 1974, gm/mi	Emission Factor (2) 1981, gm/mi	Speed (2) Correction	Total Mass of Pollutant (10^3 Kg/yr) 1974	Total Mass of Pollutant (10^3 Kg/yr) 1981
Carbon Monoxide	56	22	.8	446	181
Total Hydrocarbons	7.5	2.9	.85	63.5	25.4
Nitrogen Oxides	5.2	3.1	1.05	54.3	33.5
Total Particulates	.58	.58	1.00	5.78	5.98
Sulfur Oxides	.20	.20	1.00	1.99	2.06

(1) Source: Traffic Engineering Study, Tinker Air Force Base, Oklahoma, September 1967, U.S. Army Transportation Engineering Agency, Report 67-10.

(2) Source U.S. Environmental Protection Agency, Compilation of Air Pollutant Emission Factors, Second Edition, April, 1973.

TABLE A-17

Training Fire Emissions

1974-1981

Approximately 85 training fires are held each year. 10% of these fires consume approximately 500 gallons of stoddard fluid; the remainder consume roughly 200 gallons for a total of 19,550 gallons per year. In addition, 36 training fires utilizing scrap wood and/or 2 bales of hay are conducted per year. The number of training fires held each year is not expected to change through 1981.

Emission rates from open pool fires of stoddard fluid are unknown. However, the major pollutants are undoubtedly similar to those from JP4 pool fires for which emission rates are known. While the emission rates are probably different, the JP4 rates are used here to approximate the emissions from the stoddard fluid fire.

Emission Indices, Kg/1000 lbs. Fuel

Fuel	CO	HC	NOx	Part.	SOx
JP4	254	145	1.88	58	.182
Wood Refuse	11.4	.908	.454	3.6	Neg.[1]

Emissions 1000 Kg/yr

Fuel	Quantity	CO	HC	NOx	Part.	SOx
Stoddard Fluid	130,985 lbs.	33.3	19.0	.246	7.60	.024
Wood & Hay	3,000 lbs.	.034	.003	.001	.011	Neg.
Total		33.3	19.0	.247	7.61	.024

(1) Ref. 23, Compilation of Air Pollutant Emission Factors, Second Edition, U.S. Environmental Protection Agency AP-42.

TABLE A-18

Industrial Emissions
1974-1981

Building	Location	Emissions, 1000 Kg/yr
3001	C	50.9 Hydrocarbons
3001	C	1.1 Particulates
3105	C	12.6 Hydrocarbons
210	A	1.96 Hydrocarbons
214	A	3.23 Hydrocarbons
221	A	.313 Hydrocarbons
230	A	56.6 Hydrocarbons
414	A	2.45 Hydrocarbons
454	A	1.35 Hydrocarbons
2101	B	19.8 Hydrocarbons
2121	B	1.75 Hydrocarbons
2122	B	2.46 Hydrocarbons
6002	E	.392 Hydrocarbons
201W	A	14.5 Hydrocarbons
201E	A	5.99 Hydrocarbons
	TOTAL	174,000 Kg/yr Hydrocarbons
		1,100 Kg/yr Particulates

Source: Messrs. Ben Cranor, Larry Cook, Oklahoma City-County Health Department, Office of Air Quality Control.

TABLE A-19

Fuel Spill Emissions

1974-1981

Approximately 6600 gallons of fuel are spilled each year at Tinker Air Force Base. This evaporates and results in hydrocarbon emissions into the air.

$$6600 \text{ gallons} \times 3 \text{ Kg/gallon for JP4} = 20{,}076 \text{ Kg/yr, } 1974$$

Fuel spills are roughly proportional to the number of aircraft sorties at any particular air base. The AWACS aircraft will increase the number of sorties by 9.4 percent, so fuel spills may be expected to increase by 9.4 percent also.

$$20{,}076 \times 1.094 = 21{,}963 \text{ Kg/yr, } 1981$$

TABLE A-20

Primary Fuel Storage Emissions

Tank	Location	Type	Number	Total Capacity (Gal.)	Product	Throughput (Gal./yr)	Emission Factor (Kg/1000 gal.) [1]	Emissions/yr 10^3 Kg
349	A	FR	1	639,057	JP4	37,453,025	1.989 storage	1.27
301-04	A		4	100,000	JP4	4,268,658	11.43 breathing	1.14
							1.135 throughput	4.84
3732-35	C		4	100,000	JP4	4,268,658	11.43 breathing	1.14
							1.135 throughput	4.84
3716	C	FR	1	207,144	JP4	2,481,385	1.989 storage	.412
3730-31	C		2	50,000	JP4	3,243,922	11.43 breathing	.572
							1.135 throughput	3.68
264-66	A		2	100,000	JP4	7,334,796	11.43 breathing	1.14
							1.135 throughput	8.32
258	A		1	25,000	JP4	Neg.	11.43 breathing	.286
							1.135 throughput	--
311-20	A		10	250,000	JP4	25,671,787	11.43 breathing	2.86
							1.135 throughput	29.1
1008	South 40		1	5,000	JP4	33,701	11.43 breathing	.0572
							1.135 throughput	.0383
238	A	Su	1	1,000	JP4	12,000	11.43 breathing	.0114
							1.135 throughput	.0136
2129	B		1	1,000	JP4	20,850	11.43 breathing	.0114
							1.135 throughput	.0237

Note: All tanks underground, fixed roof, splash fill, except as noted: AG = above ground, Su = submerged fill, FR = floating roof - above ground

TABLE A-20 (Cont'd)

Primary Fuel Storage Emissions

Tank	Location	Type	Number	Total Capacity (Gal.)	Product	Throughput (Gal./yr)	Emission Factor (Kg/1000 gal.)[1]	Emissions/yr 10^3 Kg
3718	C	FR	1	420,000	JP4	5,031,195	1.989 storage	.836
273	A	FR	1	2,310,000	JP4	Future	1.989 storage	0
305-6	A		5	125,000	Avgas	1,678,682	35.46 breathing	4.43
308-10							5.675 throughput	9.53
231	A		1	12,000	Avgas	Abandoned	--	--
							--	--
3010-12	C		3	75,000	Avgas	1,007,209	35.46 breathing	2.66
							5.675 throughput	5.72
36-7	A		2	240	Mogas	1,032	35.46 breathing	.0085
							5.675 throughput	.0059
201	A		1	300	MoGas	780	35.46 breathing	.0106
							5.675 throughput	.0044
238	A	Su	1	1,000	MoGas	83,200	35.46 breathing	.0355
							3.768 throughput	.313
241	A		1	300	MoGas	519	35.46 breathing	.0106
							5.675 throughput	.0029
293	A		1	18,787	MoGas	499,206	35.46 breathing	.666
							5.675 throughput	2.83
295	A		1	18,787	MoGas	499,206	35.46 breathing	.666
							5.675 throughput	2.83
438-9	A		2	24,000	MoGas	306,405	35.46 breathing	.851
							5.675 throughput	1.74

TABLE A-20 (Cont'd)

Primary Fuel Storage Emissions

Tank	Location	Type	Number	Total Capacity (Gal.)	Product	Throughput (Gal./yr)	Emission Factor[1] (Kg/1000 gal.)	Emissions/yr 10^3 Kg
734	A		1	12,000	MoGas	153,203	35.46 breathing	.426
							5.675 throughput	.869
738-39	A	Su	2	20,000	MoGas	810,000	35.46 breathing	.709
							3.768 throughput	3.05
741	A	Su	1	10,000	MoGas	405,000	35.46 breathing	.355
							3.768 throughput	1.53
743	A	Su	1	10,000	MoGas	405,000	35.46 breathing	.355
							3.768 throughput	1.53
886	A	Su	1	12,000	MoGas	55,800	35.46 breathing	.426
							3.768 throughput	.210
932	A	Su	1	275	MoGas	781	35.46 breathing	.0098
							3.768 throughput	.0029
934	A	Su	1	275	MoGas	781	35.46 breathing	.0098
							3.768 throughput	.0029
1032	South 40		1	400	MoGas	520	35.46 breathing	.0142
							5.675 throughput	.0030
1111	South 40		1	300	MoGas	780	35.46 breathing	.0106
							5.675 throughput	.0044
1060-61	South 40		2	10,000	MoGas	76,505	35.46 breathing	.355
							5.675 throughput	.434
2108	B	AG	1	8,000	MoGas	102,135	35.46 breathing	.284
							5.675 throughput	.579

TABLE A-20 (Cont'd)

Primary Fuel Storage Emissions

Tank	Location	Type	Number	Total Capacity (Gal.)	Product	Throughput (Gal./yr)	Emission Factor[1] (Kg/1000 gal.)	Emissions/yr 10^3 Kg
2102	B		1	300	MoGas	780	35.46 breathing	.0106
							5.675 throughput	.0044
2109	B	Su	1	300	MoGas	519	35.46 breathing	.0106
							3.768 throughput	.0020
2113	B	Su	1	300	MoGas	519	35.46 breathing	.0106
							3.768 throughput	.0020
2127	B	Su	1	300	MoGas	519	35.46 breathing	.0106
							3.768 throughput	.0020
2129	B		1	10,000	MoGas	280,000	35.46 breathing	.355
							5.675 throughput	1.59
3405	C		1	12,000	MoGas	23,050	35.46 breathing	.426
							5.675 throughput	.131
3801-03	C	Su	3	360	MoGas	1,559	35.46 breathing	.0128
							3.768 throughput	.0059
4012	D		5	1,500	MoGas	7,800	35.46 breathing	.0532
							5.675 throughput	.0443
205	A		1	500	MoGas	780	35.46 breathing	.0177
							5.675 throughput	.0044
210	A		1	2,000	Diesel	1,040	5.966 breathing	.0119
							.454 throughput	.0005
240	A		1	1,000	Diesel	1,040	5.966 breathing	.0060
							.454 throughput	.0005

TABLE A-20 (Cont'd)

Primary Fuel Storage Emissions

Tank	Location	Type	Number	Total Capacity (Gal.)	Product	Throughput (Gal./yr)	Emission Factor (Kg/1000 gal.) (1)	Emissions/yr 10^3 Kg
411	A		1	2,000	Diesel	13,745	5.966 breathing	.0119
							.454 throughput	.0062
773	A	AG	1	100	Diesel	689	5.966 breathing	.0006
							.454 throughput	.0003
887	A	Su	1	1,130	Diesel	20,075	5.966 breathing	.0067
							.227 throughput**	.0046
906	A	Su	1	275	Diesel	1,304	5.966 breathing	.0016
							.227 throughput	.0003
908	A	Su	1	275	Diesel	1,304	5.966 breathing	.0016
							.227 throughput	.0003
928	A	Su	1	275	Diesel	780	5.966 breathing	.0016
							.227 throughput	.0002
930	A	Su	1	275	Diesel	780	5.966 breathing	.0016
							.227 throughput	.0002
935	A	Su	1	275	Deisel	1,304	5.966 breathing	.0016
							.227 throughput	.0003
1009	South 40		1	5,000	Diesel	34,398	5.966 breathing	.0298
							.454 throughput	.0156
1100	South 40	Su	2	1,500	Diesel	4,600	5.966 breathing	.0089
							.227 throughput	.0010
1124	South 40	Su	1	300	Diesel	780	5.966 breathing	.0018
							.227 throughput	.0002

TABLE A-20 (Cont'd)

Primary Fuel Storage Emissions

Tank	Location	Type	Number	Total Capacity (Gal.)	Product	Throughput (Gal./yr)	Emission Factor[1] (Kg/1000 gal.)	Emissions/yr 10^3 Kg
2119	B	Su	1	300	Diesel	519	5.966 breathing	.0018
							.227 throughput	.0001
3003	C		1	1,000	Diesel	6,885	5.966 breathing	.0060
							.454 throughput	.0031
3202	C		1	300	Diesel	519	5.966 breathing	.0018
							.454 throughput	.0002
3401	C	Su	1	20,000	Diesel	62,400	5.966 breathing	.119
							.227 throughput	.0142
4010	D		2	8,775	Diesel	60,357	5.966 breathing	.0524
							.454 throughput	.0274
4029	D		1	500	Diesel	3,440	5.966 breathing	.0030
							.454 throughput	.0016
4058	D	Su	1	2,000	Diesel	3,500	5.966 breathing	.0119
							.227 throughput	.0008
5802	E		1	300	Diesel	1,050	5.966 breathing	.0018
							.454 throughput	.0005
208	A		4	72,000	Fuel Oil #2	254,989	5.966 breathing	.430
							.454 throughput	.116
2102	B		1	27,000	Fuel Oil #2	29,473	5.966 breathing	.161
							.454 throughput	.0134
3001	C		1	20,000	Fuel Oil #2	238,246	5.966 breathing	.119
							.454 throughput	.108

TABLE A-20 (Cont'd)

Primary Fuel Storage Emissions

Tank	Location	Type	Number	Total Capacity (Gal.)	Product	Throughput (Gal./yr)	Emission Factor (Kg/1000 gal.)[1]	Emissions/yr 10^3 Kg
3404	C		1	244,454	Fuel Oil #2	229,786	5.966 breathing	1.46
							.454 throughput	.104
4007	D	Su	1	20,000	Fuel Oil #2	10,200	5.966 breathing	.119
							.227 throughput	.0023
5802	E		1	12,000	Fuel Oil #2	31,680	5.966 breathing	.0716
							.454 throughput	.0144
274	A	FR	1	1,050,000	Fuel Oil #2	new	.8617 storage	.905
204	A		1	500	Solvent	320	10.07 breathing	.0050
							1.090 throughput	.0003
294	A		1	18,787	Solvent	15,980	10.07 breathing	.189
							1.090 throughput	.0174
3130-31	C		2	24,000	Solvent	20,185	10.07 breathing	.2417
							1.090 throughput	.022
2111	B		7	35,000	JP5	unknown	11.43 breathing	.0400
							1.135 throughput	unknown
397	A		1	25,000	Methyl Alcohol	5,000	4.308 breathing	.1077
							.454 throughput	.0023

**ADL estimate.

(1) Source: U.S. Environmental Protection Agency, Supplement No. 1 for Compilation of Air Pollutant Emission Factors, Second Edition, July 1973.

TABLE A-21

Fuel Storage Emissions Increases, JP-4

1974-1981

AWACS E3-A aircraft consumes an average of 2200 gallons of JP4 per hour. Each sortie will last an average of 8 hours[1] and there will be 2033 sorties per year. Thus, the E3-A will increase the JP4 throughput at TAFB by

2200 x 8 x 2033 = 35,780,800 gallons.

The AWACS wing will be located in area A, and tanks 349, 264-66, 311-20, and 273 will be affected. AWACS AGE will increase JP4 consumption in area A by another 266,000 gallons.[3] Area A JP4 throughput will increase by 36,046,800 gallons. The increased throughput is expected to be distributed as follows:

Tank	Type	Number	Total Capacity Gallons	Throughput Gallons/yr 1974	Throughput Gallons/yr 1981	Emission Factor[1] (Kg/1000 gallons)	1981 Emissions (1000 Kg/yr)
264-66		2	100,000	7,334,796	7,600,795	11.43 breathing	1.14
						1.135 throughput	8.63
273	FR	1	2,310,000	0	5,824,436	1.989 storage	4.59
349	FR	1	639,057	37,453,025	67,674,889	1.989 storage	1.27
311-20		10	250,000	25,671,787	25,937,787	11.43 breathing	2.86
						1.135 throughput	29.4

(1) Source: EPA Publication AP-42, Supplement No. 1.

TABLE A-22

Fuel Storage Emissions Increases, MoGas & Diesel

1974-1981

AWACS AGE will consume 142,000 gallons of Mogas and 258,000 gallons of Diesel fuel per year (see Table A-13). This will be distributed in area A: MoGas through tanks 238, 293, 295; Diesel via truck from 3401.

Tank	Location	Type	Number	Total Capacity	Throughput - Gallons/yr 1974	1981	Emission Factor[1] (Kg/1000 gal)	1981 Emissions/yr 1000 Kg
					MoGas			
238	A	Su	1	1,000	83,200	225,200	35.46 breathing	.0355
							3.768 throughput	.849
293	A		1	18,787	499,206	570,206	35.46 breathing	.666
							5.675 throughput	3.24
295	A		1	18,787	499,206	570,206	35.46 breathing	.666
							5.675 throughput	3.24
					Diesel			
3401	C		1	20,000	62,400	320,400	5.966 breathing	.119
							.454 throughput	.145

The increased work force and vehicle mileage will mean a proportional increase in fuel sales from the base exchange (Tanks 738, 739, 741, and 743). The working emissions from these tanks will therefore increase

738,739 741 and 743	A	Su	4	40,000	1,620,000	1,677,000	35.46 breathing	1.42
							3.768 throughput	6.32

[1] Source: U.S. EPA Publication AD-42, Supplement No. 1.

TABLE A-23

Tank Truck Emissions

Fuel	Truck Capacity	No. Trucks	Load	Unload	Throughput (gallons/yr)	Emission Factor[1] Kg/1000 gal	Emissions/yr 10^3 Kg
JP4	5000	12	Bldg. 228	Apron Areas	24,642,340	11.43 breathing	.686
						.617 throughput	15.2
Avgas	5000	2	Bldg. 290	Apron Areas	671,473	35.46 breathing	.355
						2.815 throughput	1.89
Mogas	1200	2	293, 295	All Areas	998,412	35.46 breathing	.0851
						2.815 throughput	2.81
Diesel	1200	1	3401	All Areas	62,400	5.966 breathing	.0072
						.309 throughput	.0193
				1981 CHANGES			
Diesel	1200	1	3401	All Areas	320,400	5.966 breathing	.0072
						.309 throughput	.099

(1) Source: U.S. EPA Publication AP-42, Supplement No. 1.

TABLE A-24

Aircraft & AGE Refueling

Total JP4 used at TAFB = 37,453,025 gallons/yr

Total fuel consumed in test cells = 10,749,945 gallons/yr

Total JP4 pumped into aircraft and AGE = 26,703,080 gallons JP4

Working emissions from fuel tanks (JP4)

26,703,080 gallons x .817 Kg/10^3 gallons(1) = 21,816 Kg/yr 1974

Total Avgas used at TAFB = 1,678,682 gallons/yr

Working emissions from aircraft fuel tanks (Avgas)

1,678,682 gallons/yr x 5.63 Kg/10^3 gallons(1) = 9,450 Kg/yr 1974 & 1981

TOTAL 31,266 Kg/yr 1974

In 1981, 73,499,825 gallons of JP4 will be used, test cell activity will consume the same volume of fuel as in 1974, so aircraft AGE refuel emissions will be:

62,749,880 x .817 Kg/10^3 gallons(1) = 51,267 Kg/yr 1981

TOTAL 60,717 Kg/yr 1981

(1) Source: Ref. 24, Compilation of Air Pollutant Emission Factors, Second Edition, Supplement No. 1, U.S. EPA AP-42.

TABLE A-25

Total Mogas consumed in vehicle at TAFB = 2,717,967 in 1974

1974 Filling Emissions:

$2,717,967 \times 5.30\ \text{Kg}/10^3\ \text{gallons}^{(1)} = 14.4 \times 10^3\ \text{Kg/yr}$

Vehicle Mogas consumption is proportional to annual vehicle mileage.

1981 mileage is 10,303,214; 1974 mileage is 9,954,142 miles/yr.

Mogas usage is: $\frac{10,303,214}{9,954,142} \times 2,717,967 = 2,813,281$

1981 Filling Emissions:

$2,813,281 \times 5.3\ \text{Kg}/10^3\ \text{gallons}^{(1)} = 14.9 \times 10^3\ \text{Kg/yr}$

plus AGE Mogas, 142,000 gallons $\times$ 5.3 Kg/10^3 gallons = .753 $\times 10^3$ Kg/yr

1981 Filling Emissions = 15.7 $\times 10^3$ Kg/yr

(1) Source: U.S. EPA Publication AP-42, Supplement No. 1.

APPENDIX B

ARRIVAL AND DEPARTURE PROCEDURES OF AIRCRAFT
UTILIZING TINKER AFB

APPENDIX B

This appendix has been provided to assist the interested reader in understanding prescribed arrival and departure procedures of aircraft utilizing Tinker.

It contains information on High Altitude Letdowns (Figures B-1, 2 and 3), Low Altitude Letdowns (Figures B-4, 5 and 6), and Standard Instrument Departures (Figures B-7 and 8).

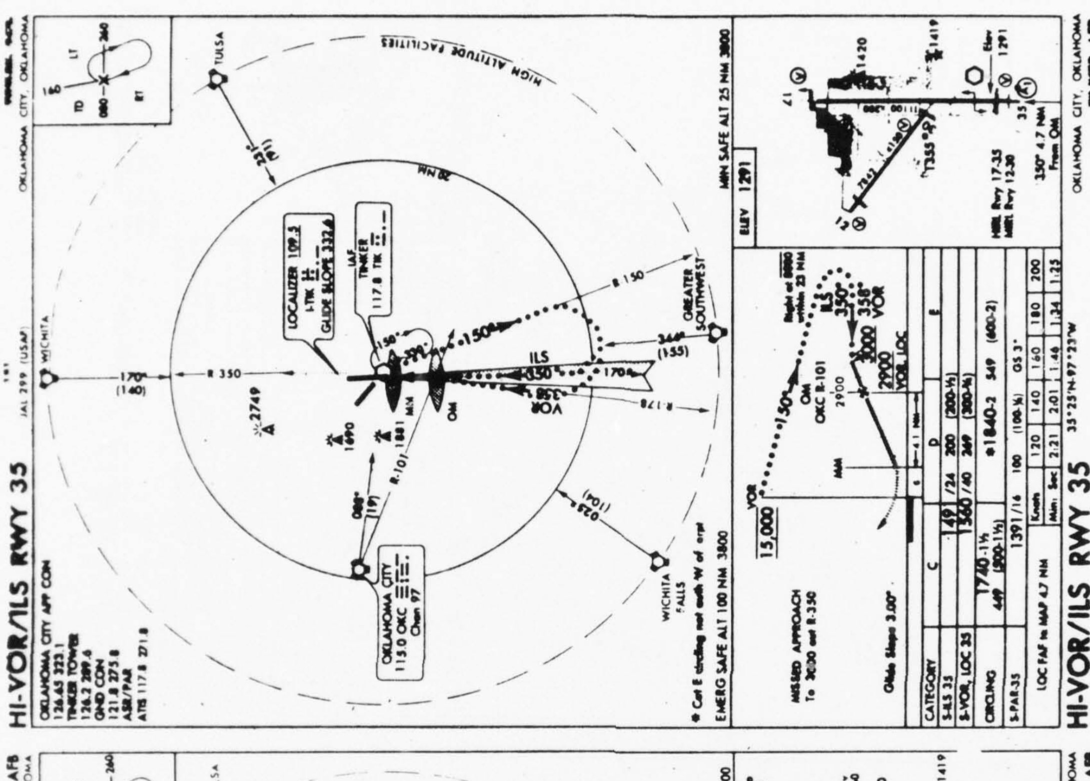

FIGURE B–1 HIGH ALTITUDE LETDOWN

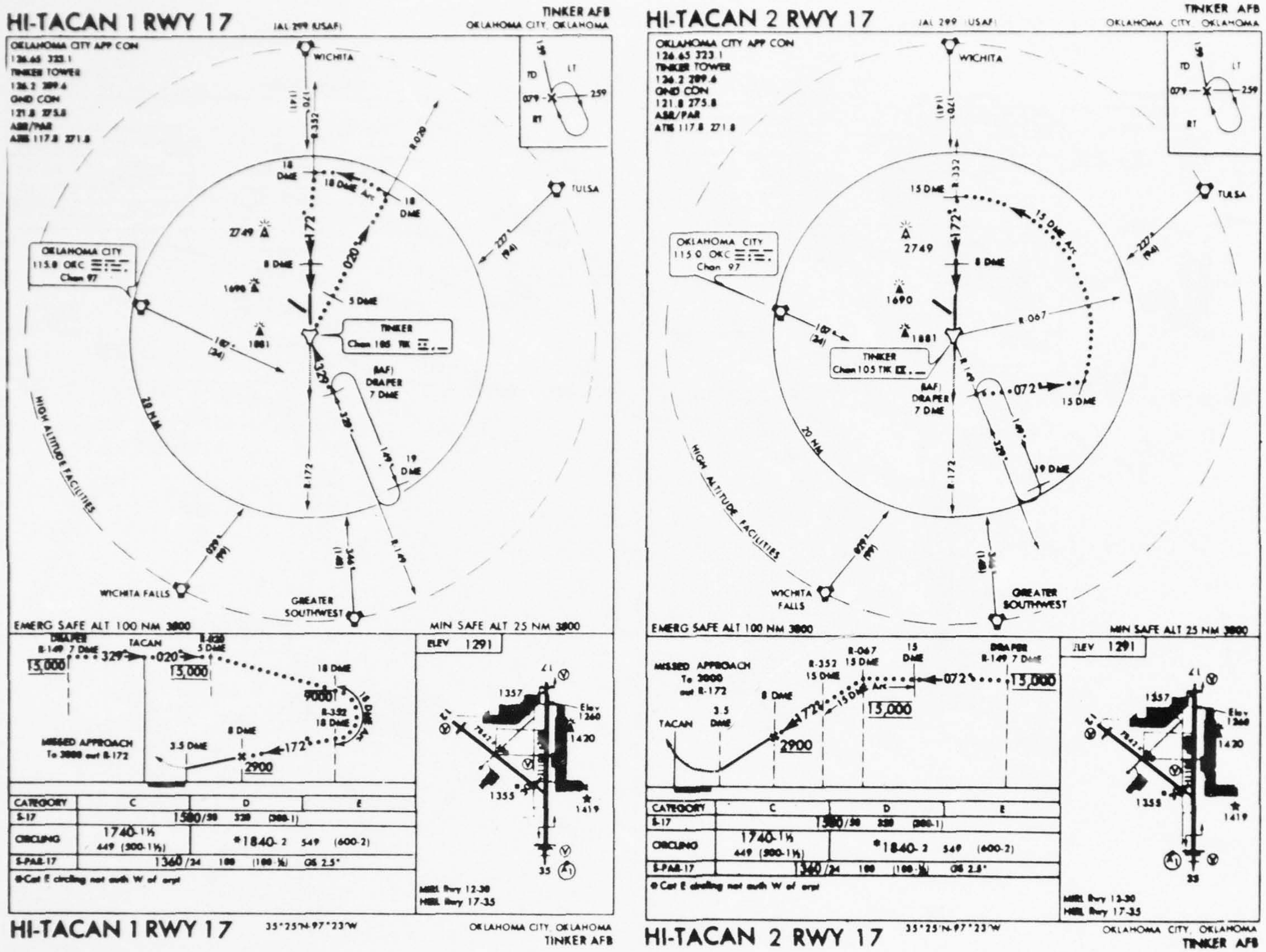

FIGURE B-2 HIGH ALTITUDE LETDOWN

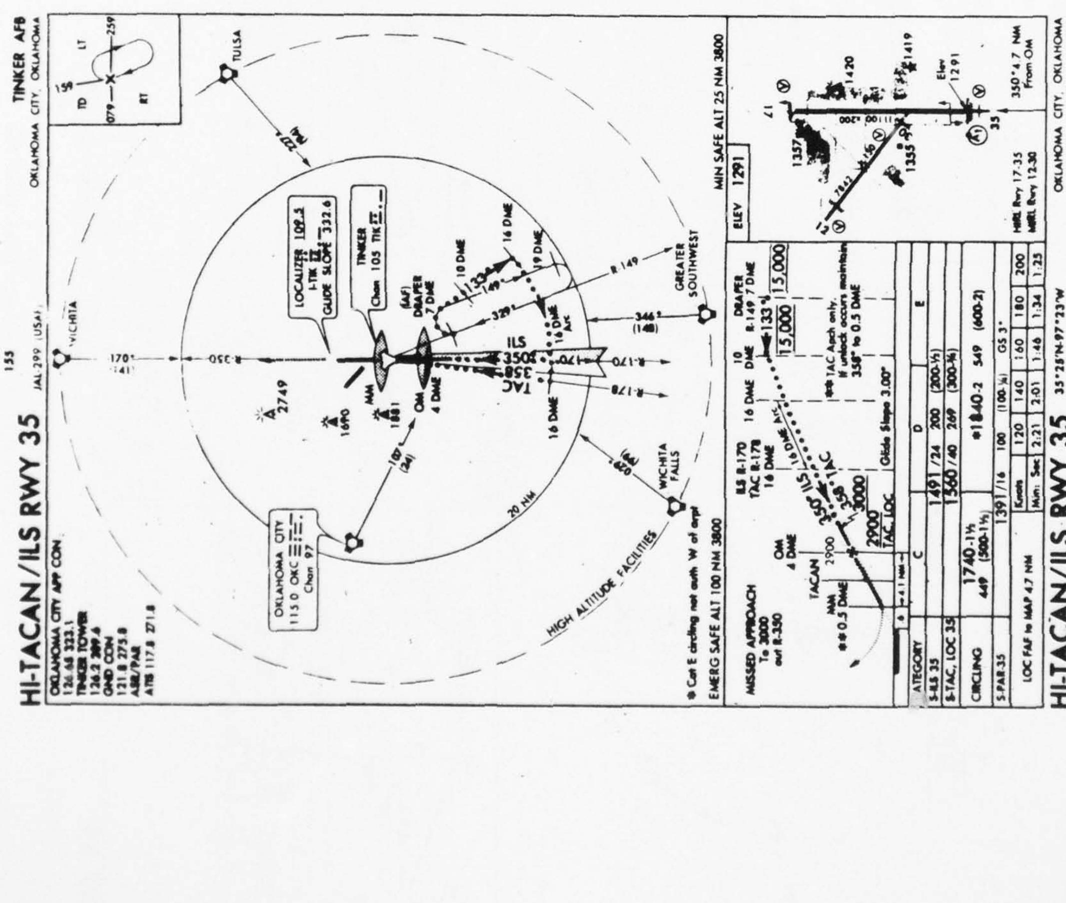

FIGURE B-3 HIGH ALTITUDE LETDOWN

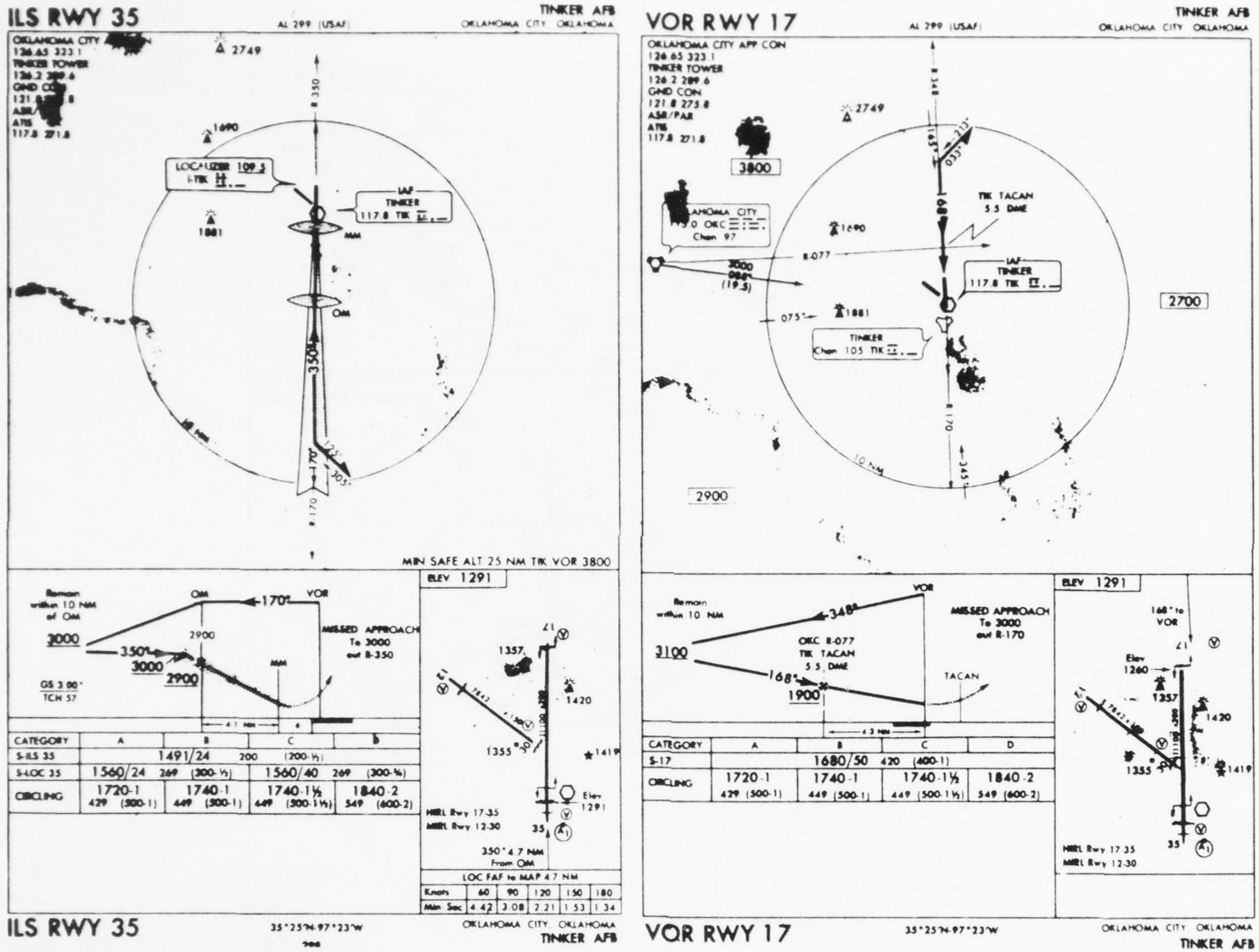

FIGURE B–4 LOW ALTITUDE LETDOWN

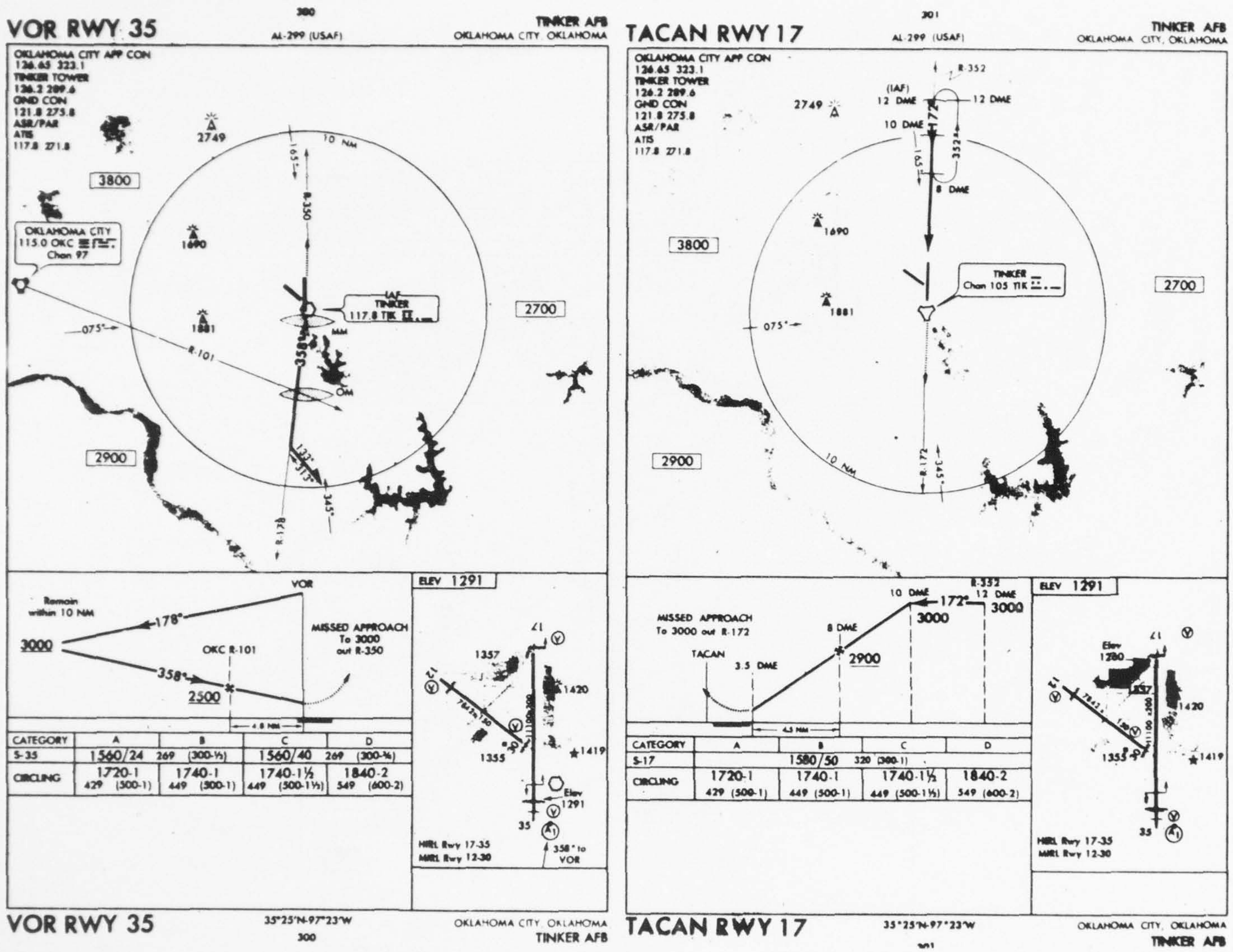

FIGURE B–5 LOW ALTITUDE LETDOWN

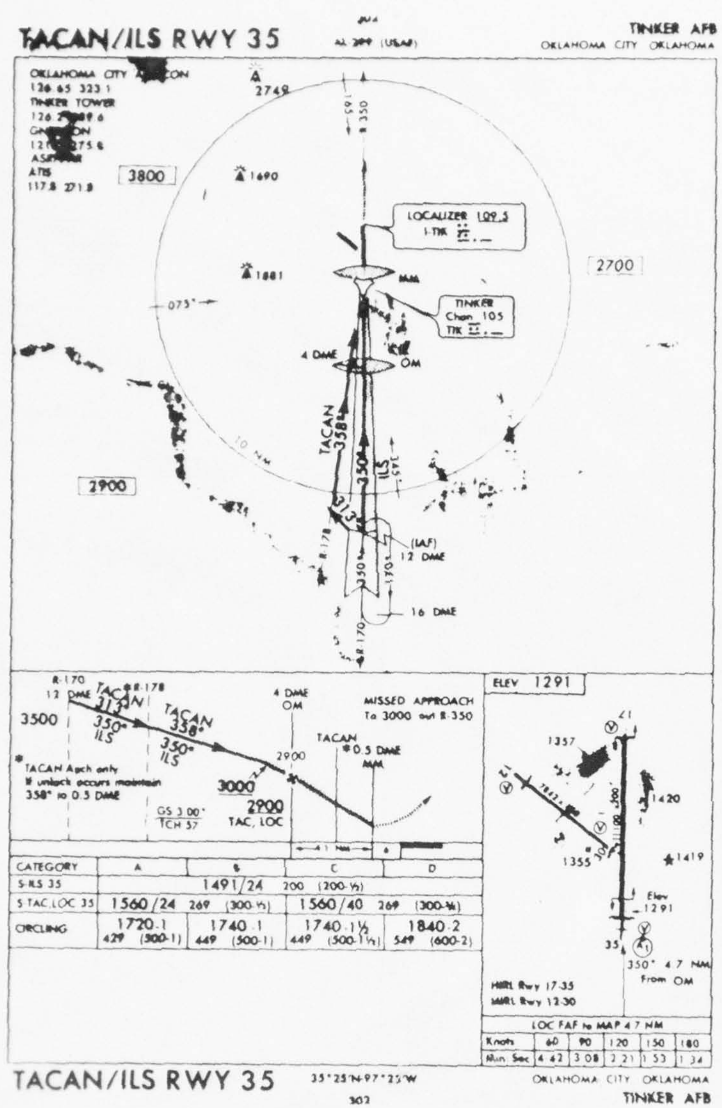

FIGURE B–6 LOW ALTITUDE LETDOWN

AD-A071 111 DEPARTMENT OF THE AIR FORCE WASHINGTON DC F/G 1/2

ENVIRONMENTAL IMPACT ANALYSIS PROCESS. ENVIRONMENTAL IMPACT STA--ETC(U)

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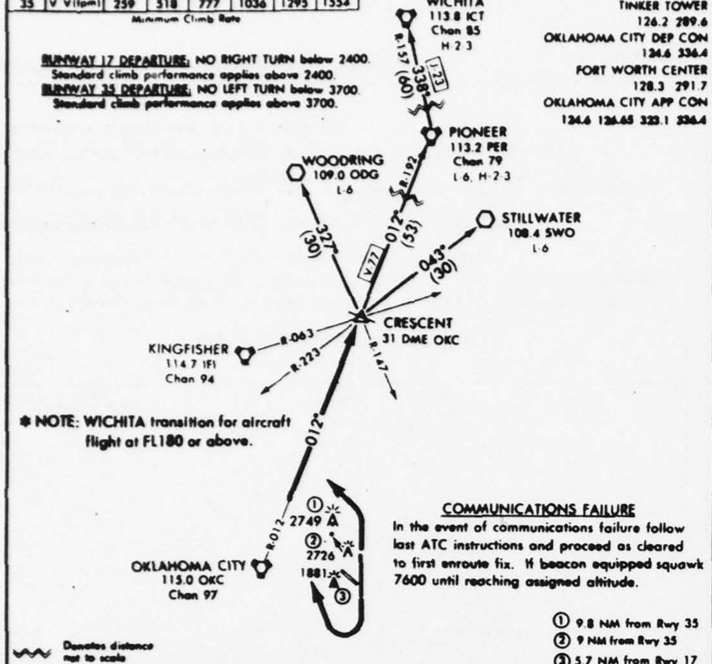
CRESCENT-ONE DEPARTURE (8YC1·8YC)

TINKER AFB
OKLAHOMA CITY, OKLAHOMA

Rwy	Knots	60	120	180	240	300	360
17	V V(fpm)	191	382	573	764	955	1146
35	V V(fpm)	259	518	777	1036	1295	1554

Minimum Climb Rate



DEPARTURE ROUTE DESCRIPTION

Depart Runway 17 or 35: on specified heading or routing, to intercept and proceed via OKC R-012 to CRESCENT INT. Then via __________(transition) or (assigned route). Maintain __________(altitude assigned by ATC).

PIONEER TRANSITION (8YC1·PER): Via PER R-192 to PER.

STILLWATER TRANSITION (8YC1·SWO): Direct to SWO.

*WICHITA TRANSITION (8YC1·ICT): Via PER R-192 to PER, then via J-23 to ICT

WOODRING TRANSITION (8YC1·ODG): Direct to ODG

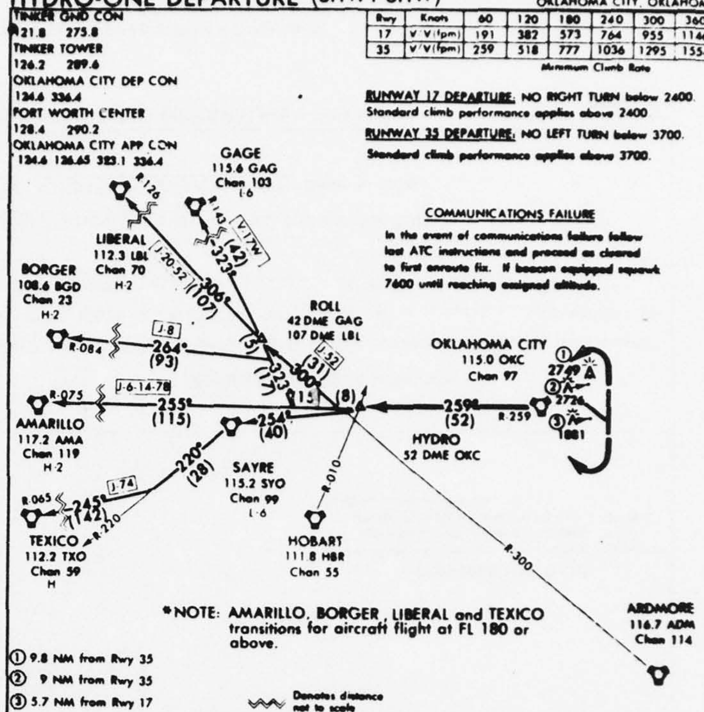
CRESCENT-ONE DEPARTURE (8YC1·8YC) — OKLAHOMA CITY, OKLAHOMA TINKER AFB

HYDRO-ONE DEPARTURE (8HW1·8HW)

TINKER AFB
OKLAHOMA CITY, OKLAHOMA

Rwy	Knots	60	120	180	240	300	360
17	V V(fpm)	191	382	573	764	955	1146
35	V V(fpm)	259	518	777	1036	1295	1554

Minimum Climb Rate



DEPARTURE ROUTE DESCRIPTION

Depart Runway 17 or 35 on specified heading or routing, to intercept and proceed via OKC R-259 to HYDRO INT. Then via __________ (transition) (or assigned route). Maintain__________(altitude assigned by ATC).

* AMARILLO TRANSITION (8HW1·AMA): Via OKC R-259 and AMA R-075 to AMA.
* BORGER TRANSITION (8HW1·BGD): Via OKC R-259 and GAG R-143 to J-8. Then via J-8 to BGD.

GAGE TRANSITION (8HW1·GAG): Via OKC R-259 and GAG R-143 to GAG.

* LIBERAL TRANSITION (8HW1·LBL): Via OKC R-259 and J-52 to LBL.

ROLL TRANSITION (8HW1·8RL): Via OKC R-259 and GAG R-143 to ROLL INT.

SAYRE TRANSITION (8HW1·SYO): Direct to SYO.

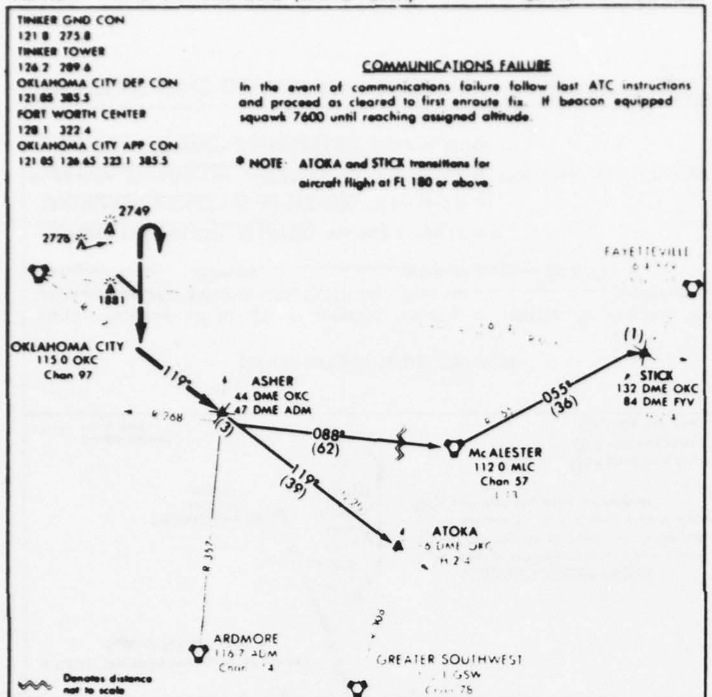
* TEXICO TRANSITION (8HW1·TXO): Direct to SYO. Then via SYO R-220 and J-74 to TXO.

HYDRO-ONE DEPARTURE (8HW1·8HW) — OKLAHOMA CITY, OKLAHOMA TINKER AFB

FIGURE B–7 STANDARD INSTRUMENT DEPARTURES AT TINKER

ASHER - TWO DEPARTURE (8AH2 · 8AH)

TINKER AFB
OKLAHOMA CITY, OKLAHOMA



DEPARTURE ROUTE DESCRIPTION

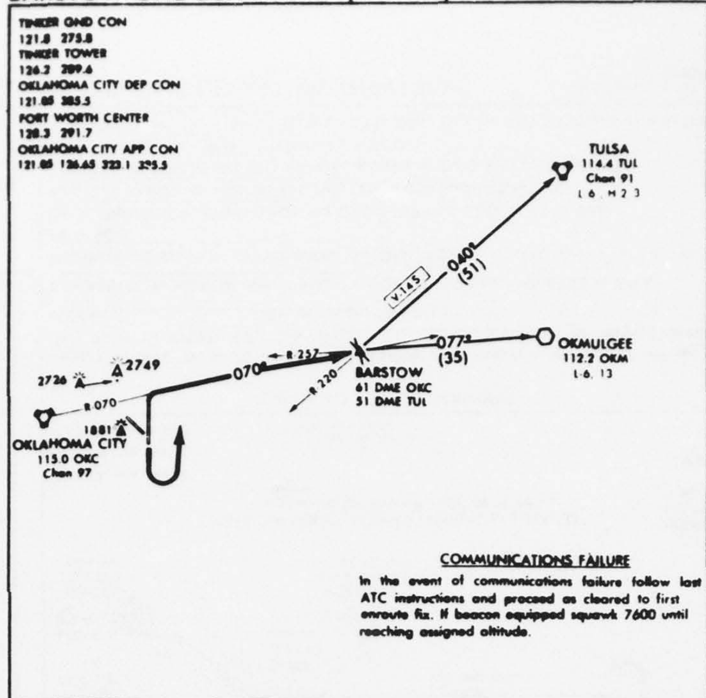
Depart Runway 17 or 35 on specified heading or routing, to intercept and proceed via OKC R-119 to ASHER INT. Then via ______________(transition) or (assigned route). Maintain______________ (altitude assigned by ATC).

- * **ATOKA TRANSITION (8AH2 · 8AK):** Via OKC R-119 to ATOKA INT.
- MC ALESTER TRANSITION (8AH2 · MLC): Via OKC R-119 and MLC R-268 to MLC.
- * **STICK TRANSITION (8AH2 · STICK):** Via OKC R-119 and MLC R-268 to MLC. Then via MLC R-055 and J-6-14 to STICK INT.

ASHER - TWO DEPARTURE (8AH2 · 8AH) OKLAHOMA CITY, OKLAHOMA TINKER AFB

BARSTOW-ONE DEPARTURE (8YB1 · 8YB)

TINKER AFB
OKLAHOMA CITY, OKLAHOMA



DEPARTURE ROUTE DESCRIPTION

Depart Runway 17 or 35 on specified heading or routing, to intercept and proceed via OKC R-070 to BARSTOW INT. Then via______________(transition) or (assigned route). Maintain____________(altitude assigned by ATC).

TULSA TRANSITION (8YB1 · TUL): Via TUL R-220 to TUL.

OKMULGEE TRANSITION (8YB1 · OKM): Direct to OKM.

BARSTOW-ONE DEPARTURE (8YB1 · 8YB) OKLAHOMA CITY, OKLAHOMA TINKER AFB

FIGURE B–8 STANDARD INSTRUMENT DEPARTURES AT TINKER

APPENDIX C

NOISE DUE TO AIRCRAFT OPERATIONS

APPENDIX C. NOISE DUE TO AIRCRAFT OPERATIONS

C.1 BACKGROUND

In the last several years, there has been a continued development of a variety of measures and criteria for environmental noise due to aircraft operations. As a result, there has developed a considerable amount of confusion relative to such noise measures and criteria, their relationship to each other, and their applicability, interpretation, and use in land use planning and environmental impact studies. To aid in the understanding of this situation, this section includes a short summary of the characteristics of several aircraft noise measures of interest and the methods currently used to evaluate the noise impact upon the surrounding area.

C.2 THE MEASURES OF SINGLE NOISE EVENTS

The most basic measure of a single noise event is in terms of sound pressure level (SPL), in decibels (dB). This measure is based on equal weighting of all audible frequencies making up the noise signal. Since the ear is not equally sensitive over this audible frequency range, however, the SPL measure is not a good indicator of the subjective loudness level of a noise signal. To account for this, various modifications of the SPL, incorporating frequency weighting characteristics based on well-established criteria for subjective loudness properties of noise signals, have been developed and are widely used. The most commonly used is the so called "A-weighted" sound level, expressed in dBA. A-weighted sound levels are widely applied as a measure of a variety of transportation, industrial, and community noise sources. Some typical values of sound levels in dBA are shown in Table C.1.

Psychoacoustic studies carried out in the early 60's, particularly by Kryter, concluded that the frequency weighting used for subjective loudness measures were not adequate as measures of subjective annoyrance to aircraft noise. These studies, which were carried out shortly after the introduction of jet-powered aircraft into commercial service, investigated the apparent higher level of annoyance associated with jet aircraft as compared with that of propeller-driven aircraft having the same overall SPL or the same loudness. Kryter found that the differences in the spectral distribution of jet aircraft noise (generally more noise in the higher frequency region) relative to propellor-driven aircraft noise resulted in a higher annoyance to most of the people tested in his studies. To correlate this relationship more properly, Kryter developed the concept of Perceived Noise Level (PNL), a single-number noise measure, for a prescribed noise event such as an aircraft flyover. The PNL is characterized by both the absolute sound pressure levels of the noise event, and by the spectrum (i.e., frequency content) of the noise. This information is converted into a perceived noisiness by the use of annoyance criteria which have been developed experimentally. Thus, the PNL, in terms of Perceived Noise Decibels (PNdB), is a <u>calculated</u> measure relating the physical levels of noise and judgments of the subjective annoyance associated with the noise [C3].

Table C-1
Sound Level and Loudness of Typical Noises in Indoor and Outdoor Environments
(noise levels given in dBA)

dB(A) Ref. 0.0002 μbar	SUBJECTIVE IMPRESSION	COMMUNITY (Outdoor)	HOME OR INDUSTRY (Indoor)	RELATIVE LOUDNESS (Human Judgment of Different Sound Levels)
130				
120	Uncomfortably	Military Jet Aircraft Take-Off With After-Burner @ 50 ft (130)	Oxygen Torch (121)	32 Times as Loud
110	Loud	Turbo-Fan Aircraft @ Take-Off Power @ 200 ft (118)	Riveting Machine (110) Rock-N-Roll Band (108-114)	16 Times as Loud
100	Very	Jet Flyover @ 1000 ft (103) Boeing 707, DC-8 @6080 ft Before Landing (106)	Pile Driver @ 50 ft (101)	8 Times as Loud
90	Loud	Power Mower (96) Boeing 737, DC-9 @ 6080 ft Before Landing (97), Motorcycle @ 25 ft (90)	Newspaper Press (97), Inside Subway Train - NY (95)	4 Times as Loud
80		Car Wash @ 20 ft (89), Prop. Plane Flyover @ 1000 ft. (88), Diesel Truck, 40 mph @ 30 ft (84), Diesel Train, 45 mph @ 100 ft (83)	Food Blender (88), Milling Machine (85), Garbage Disposal (80), Symphony Orchestra (Audience) (80)	2 Times as Loud
70	Moderately Loud	High Urban Ambient Sound (80), Passenger Car, 65 mph @ 25 ft (77), Freeway @ 50 ft from Pavement Edge, 10 a.m. (76 ± 6)	Living Room Music (76), TV-Audio, Vacuum Cleaner (70)	REFERENCE LOUDNESS 70 dBA
60		Air Conditioning Unit @ 100 ft (60)	Cash Register @ 10 ft (65-70), Electric Typewriter @ 10 ft (64) Dishwasher (Rinse) @ 10 ft (60), Conversation (60)	1/2 as Loud
50	Quiet	Large Transformers @ 100 ft (50)	Typical Business Office (55)	1/4 as Loud
40		Bird Calls (44), Lower Urban Ambient Sound (40)		1/8 as Loud

Sources: References C-1, C-2

Subsequently, a refinement of the PNL measure was introduced to include the effects of the duration of the noise (above some threshold value) and a correction for the presence of strong pure-tone components in the noise signal. The reasons for these refinements to the more basic PNL were that further experiments indicated that the subjective reaction (annoyance) to aircraft noise was dependent upon both the maximum level and the duration of the single event time-history, and that the pure-tone (whine) resulting from the front compressor or turbofan engines was both of high intensity and of particular annoyance. This modified measure was termed the Effective Perceived Noise Level (EPNL) and is expressed in terms of Effective Perceived Noise Decibels (EPNdB). Thus, both the PNL and EPNL measures contain objective and subjective noise factors, and both are evaluations of a single noise event.

The determination of the PNL or EPNL requires an involved series of measurements and analyses, utilizing complex measuring equipment and, generally, automatic processing of the noise data, particularly for transient noise events. The A-weighted sound level, on the other hand, can be obtained with relatively simple measuring equipment. Furthermore, more recent research on annoyance to noise events has indicated that the A-weighted sound level is as good an indicator of subjective response as the more complex PNL or EPNL measures. For these reasons, together with the fact th-t the A-weighted sound level has been widely used for years in community and transportation noise studies, the Environmental Protection Agency has suggested that the A-weighted sound level be used for aircraft noise as well. The analogous measure to PNL and EPNL for a single noise event utilizing A-weighted sound levels is the Sound Exposure Level (SEL) which is the total accumulation of A-weighted sound level during the entire duration of the event (such as an aircrat takeoff).

For aircraft noise purposes, the evaluation of the PNL, EPNL, or SEL is carried out at various ranges for both air-to-ground and ground-to-ground propagation paths so that the noise data may be developed into so-called "footprint" contours. These contours, which are analogous to topographic lines, indicate for each operational event such as a takeoff the locus of all the points at ground level at which the noise levesl are equal to some prescribed value. Thus each of these footprints enclose land areas which will experience noise levels at or above the prescribed value due to the single event.

C.3 NOISE ENVIRONMENT DESCRIPTORS

In addition to the measure of the single noise event, the descriptor of the overall noise environment requires the number and distribution of these occurences during some specified period of time. For discrete measures, such as aircraft operations, a 24-hour period is used, leading to the formulation of a daily noise environment descriptor.

TABLE C-2

Approximate Equivalence of Noise Exposure Descriptors

NEF (dB)	L_{dn} (dB)	CNR (dB)
30	65	100
40	75	115

TABLE C-3

Expected Response of Residential Communities to Noise Exposure Forecast Zones

Noise Exposure Forecast (dB)	Zone	Description of Expected Response
Less than 30	A	Some noise complaints are possible, and noise may interfere with some activities
30 to 40	B	Individual reaction may include vigorous, repeated complaints, and concerted group action is also a possibility. Construction of homes, schools, churches, etc., should not be undertaken without a complete analysis of the situation.
Over	C	Serious noise problems are likely. No activity, nor building construction of any sort, should be carried on without a complete analysis of the situation.

Many such composite descriptors of daily noise exposure levels have been developed. Three of particular interest, because of their use in the United States for military applications, are the Composite Noise Rating (CNR) and the Noise Exposure Forecast (NEF), both developed by Bolt, Beranek, and Newman, Inc. [C-5] and the Day-Night Sound level (L_{dn}) developed by the Environmental Protection Agency [C-4]. These composite noise descriptors are obtained, respectively, from the PNL, EPNL, and SEL values for the individual aircraft events, and correction factors are applied for the number of such events occurring within certain specified times during a 24-hour period. Weighting factors are utilized for the operations occurring during time periods to account for the increased sensitivity to noise in the evening or nighttime hours.

Calculations of the first two of these composite levels in terms of their corresponding single-event measures; are as follows:

$$CNR = PNL + 10 \log (N_D + 16.7\, N_N) - 13$$

$$NEF = EPNL + \log (N_D + 16.7\, N_N) - 88$$

where N_D = number of flights during the day (0700-2200)

N_N = number of flights during the night (2200-0700)

The calculations are seen to be quite similar; the principal difference being the specific noise measure used for individual aircraft noise intrusions. Note also that the summation of the noise events is on a "10 log N", or energy basis. These characteristics have been suggested by evidence obtained from psychoacoustic experimental studies [B-5, B-6].

The calculations of L_{dn} is in terms of the "equivalent sound level", L_{eq}, which is the energy of the SEL values over separate daytime and nightime periods.

In this case, the formulation becomes:

$$L_{dn} = 10 \log \left[\frac{15}{24} \left\{10^{L_d/10)}\right\} + \frac{9}{24}\ 10^{\left(\frac{L_n + 10}{10}\right)}\right]$$

where L_d = L_{eq} for the daytime (0700 - 2200)

L_n = L_{eq} for the nighttime (2200 - 0700)

Here, a 10 db nighttime weighting is used on the nightime equivalent sound level. Note that in this formulation, the single-event measure does not appear directly, but is included in the energy-summed values of L_{eq}.

The relationships between the single-event noise measures (PNL, EPNL, SEL) vary with aircraft types, type of operation, and with the measurement distance from the aircraft. As a consequence, the correlations among the noise exposure descriptors will vary with the specific airport situations. Approximate correlations can, however, be established assuming average mixes of aircraft types and operations schedules. Following such a procedure for a range of airport situations has led to the approximate equivalences shown in Table C-2.

C.4 NOISE EXPOSURE CONTOURS

As previously indicated, the basic noise data obtained experimentally for each aircraft operation is interest is presented in terms of noise level as a function of distance from the aircraft. (Plots of this type for the A-4 and E-3A aircraft are shown on Figures 3.3.3-A and 4.2.1-A). When this basic information is used, both the single-event noise measures and the overall noise exposure descriptors can be evaluated, for a given set of conditions, at any point or site of interest. For a single event, such as takeoff of a particular aircraft, collections of points having the same SEL, for example, will produce a set of contours describing the noise "foot print" for this event. Similarly, contours of equal values of the noise exposure descriptor can be developed, delineating zones or areas around the ariport which are above or below prescribed values of the noise exposure descriptor of interest.

The methodology for the development of these contours is straight-forward, but lengthy in cases in which there are several types of aircraft to consider. The original formulation in terms of CNR was set up for hand calcuiations, using the basic PNL "foot print" for each aircraft type and modifying the numerical value of each contour to account for number and type of operation, time of day, runway utilization percentage, engine runups, etc. The basic increment in this procedure was 5 dB or approxmiately a factor of 3 to 1; consideration of smaller incremental changes would have significantly increased the computational complexity. The later formulations in terms of NEF and L_{dn} have been coded for computer calculations, so that the preparation of the basic aircraft and operational data is the only input needed to produce the desired contour information.

Basicallly, the noise exposure levesl and zones developed in this manner are useful guides in land use planning and zoning, in the assessment of the environmental impact of proposed changes in the airport activities, and in the determination of the relative merits of various noise abatement procedures and strategies in the vicinity of a specific airport.

The depiction of noise exposure by such contours for airport environments has its limitations, however, since many variable factos are inherent in the prediction of the basic single-event noise measure itself, and in the assumptions of flight profiles, and meteorological conditions. On the basis of the assumption normally utilized in such forecast descriptors, noise exposure contorus generally considered to have a variability of as much as ±5 dB.

C.5 THE INTERPRETATION AND USE OF NOISE EXPOSURE DATA

Empirical relationships have been developed between various levels of noise exposure and expected levels of community response. These relationships have been evolved from an accumulation of case histories involving aircraft noise complaints near civil and military airports and from psychoacoustic studies. The relationships derived for the NEF methodology are shown in Table C-3.

In addition to the assessment of community response in terms of noise exposure levels, guides for evaluating the probable impact of aircraft operations for various categories of land use have been concurrently developed for the CNR [C-6] and NEF [C-5] methodologies. These developments have been based upon the noise complaint case histories, together with information on speech interference criteria, subjective tests on noise acceptability, and on noise insulation provided by typical building construction methods. These guides have been expanded under the AICUZ program in terms of the L_{dn} methodology to include a wide category of land uses and ot include compatibility requirements consistent with the accident potential zones developed under AICUZ. A complete listing of these AICUZ Land Use Compatibility Guidelines is given in Appendix D.

The land use categories encompass a rather wide range of human activities having varying sensitivities to noise intrusions. Hence, the interpretations should be taken as guides, not as absolute criteria applicable to all activities or sites falling into a given classification. In application to a specific site, some adjustments in boundaries or interpretations may be desirable. Typical influences to consider include:

- Previous community experience, and previous complaint history in the immediate neighborhood.

- Influence of the existing noise environment due to industrial or surface transportation noise sources. For example, the introduction of aircraft noise in rural area where existing background noise levels are very low would produce a much more apparent change in noise environment, and likely more pronounced reaction from residents, than would aircraft noise introduced in a dense urban area long exposed to traffic noise.

- Time period of land use activities. The noise exposure values consider both daytime and nighttime operations with a heavy weighting factor applied for nighttime operation. Such considerations are particularly appropriate for residential land planning, but may lead to over-estimation of noise exposure values for activities which are confined to daytime hours only, such as schools.

The noise compatibility interpretation boundaries are based upon the type of building construction which would normally be used where aircraft noise is on no concern. Thus, the land use compatibility ratings for schools assume building construction involving single glazing in classrooms. Special noise abatement considerations, incorporating double glazing or elimination of windows entirely, for example, have not been considered. Obviously, for many buildings, added noise insulation can be provided during construction.

References - Appendix C

C-1 Shultz, T. J., "Noise Assessment Guidelines: Technical Background," HUD Report No. TE/NA 172.

C-2 Starr, E. A., "Measuring Noise Pollution," IEEE Spectrum, June 1972.

C-3 Kryter, K. E., "Scaling Human Reactions to Sound from Aircraft," J. Acoust. Soc. AM. 31, 1415-1429, 1959.

C-4 "Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety," prepared by U. S. Environment Protection Agency, Report No. 550/9-74-004, March 1974.

C-5 Galloway, W. J. and D. E. Bishop, "Noise Exposure Forecasts: Evolution, Evaluation, Extensions, and Land Use Interpretation," Report No. FAA-NO-70-9, August 1970.

C-6 "Land Use Planning Relating to Aircraft Noise," Bolt, Beranek, and Newman, Inc., October 1964.

APPENDIX D

LAND USE COMPATIBILITY GUIDELINES

LAND USE COMPATIBILITY GUIDELINES *

SLUCM* CODE	LAND USE CATEGORY	COMPATIBLE USE DISTRICTS												
		1	2	3	4	5	6	7	8	9	10	11	12	13
		L_{dn} 85	APZ I L_{dn} 80-85	APZ I L_{dn} 75-80	APZ I L_{dn} 70-75	APZ I L_{dn} 65-70	L_{dn} 80-85	L_{dn} 75-80	APZ II L_{dn} 80-85	APZ II L_{dn} 75-80	APZ II L_{dn} 70-75	APZ II L_{dn} 65-70	L_{dn} 70-75	L_{dn} 65-70
	RESIDENTIAL													
11x	Single Family	N	N	N	N	N	N	N	N	N	$30^{1,2}$	$25^{1,2}$	30^{2}	25^{2}
11x	Two Family	N	N	N	N	N	N	N	N	N	N	N	30^{2}	25^{2}
11x	Multi-family dwelling	N	N	N	N	N	N	N	N	N	N	N	30^{2}	25^{2}
12	Group quarters	N	N	N	N	N	N	N	N	N	N	N	30^{2}	25^{2}
13	Residential hotels	N	N	N	N	N	N	N	N	N	N	N	30^{2}	25^{2}
14	Mobile home parks or courts	N	N	N	N	N	N	N	N	N	N	N	30^{2}	25^{2}
15	Transient lodging - hotels, motels	N	N	N	N	N	N	35^{2}	N	N	N	N	30^{2}	25^{2}
19	Other residential	N	N	N	N	N	N	N	N	N	N	N	30^{2}	25^{2}
	INDUSTRIAL/MANUFACTURING[3]													
21	Food and kindred product	N	N	N	N	N	Y^{4}	Y^{5}	Y^{4}	Y^{5}	Y^{6}	Y	Y^{6}	Y
22	Textile mill products	N	N	N	N	N	Y^{4}	Y^{5}	N	N	N	N	Y^{6}	Y
23	Apparel	N	N	N	N	N	Y^{4}	Y^{5}	N	N	N	N	Y^{6}	Y
24	Lumber & wood products	N	Y^{4}	Y^{5}	Y^{6}	Y	Y^{4}	Y^{5}	Y^{4}	Y^{5}	Y^{6}	Y	Y^{6}	Y
25	Furniture & fixtures	N	Y^{4}	Y^{5}	Y^{6}	Y	Y^{4}	Y^{5}	Y^{4}	Y^{5}	Y^{6}	Y	Y^{6}	Y
26	Paper & allied products	N	Y^{4}	Y^{5}	Y^{6}	Y	Y^{4}	Y^{5}	Y^{4}	Y^{5}	Y^{6}	Y	Y^{6}	Y
27	Printing, publishing	N	Y^{4}	Y^{5}	Y^{6}	Y	Y^{4}	Y^{5}	Y^{4}	Y^{5}	Y^{6}	Y	Y^{6}	Y
28	Chemicals & allied products	N	$Y^{3,4}$	$Y^{3,5}$	$Y^{3,6}$	Y^{3}	Y^{4}	Y^{5}	$Y^{3,4}$	$Y^{3,5}$	$Y^{3,6}$	Y^{3}	Y^{6}	Y
29	Petroleum refining and related industries	N	N	N	N	N	Y^{4}	Y^{5}	N	N	N	N	Y^{6}	Y

This table is a guide. Adaptations to fit local conditions and more precise land use category designations are required based on the criteria of the foregoing narrative.

* See pages D-7 thru D-9 for legend.

LAND USE COMPATIBILITY GUIDELINES

SLUCM* CODE	LAND USE CATEGORY	COMPATIBLE USE DISTRICTS												
		1	2	3	4	5	6	7	8	9	10	11	12	13
		L_{dn} 85	APZ I L_{dn} 80-85	APZ I L_{dn} 75-80	APZ I L_{dn} 70-75	APZ I L_{dn} 65-70	L_{dn} 80-85	L_{dn} 75-80	APZ II L_{dn} 80-85	APZ II L_{dn} 75-80	APZ II L_{dn} 70-75	APZ II L_{dn} 65-70	L_{dn} 70-75	L_{dn} 65-70
	INDUSTRIAL MANUFACTURING													
31	Rubber & misc plastic	N	Y^4	Y^5	Y^6	Y	Y^4	Y^5	Y^4	Y^5	Y^6	Y	Y^6	Y
32	Stone, clay & glass products	N	Y^4	Y^5	Y^6	Y	Y^4	Y^5	Y^4	Y^5	Y^6	Y	Y^6	Y
33	Primary metal industries	N	Y^4	Y^5	Y^6	Y	Y^4	Y^5	Y^4	Y^5	Y^6	Y	Y^6	Y
34	Fabricated metal products	N	Y^4	Y^5	Y^6	Y	Y^4	Y^5	Y^4	Y^5	Y^6	Y	Y^6	Y
35	Professional, scientific & controlling instru	N	N	N	N	N	N	30	N	N	N	N	25	Y
39	Misc manufacturing	N	Y^4	Y^5	Y^6	Y	Y^4	Y^5	Y^4	Y^5	Y^6	Y	Y^6	Y
	TRANSPORTATION, COMMUNICATIONS & UTILITIES													
41	Railroad, rapid rail transit	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
45	Highway & street ROW	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
46	Auto parking	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
47	Communications (noise sensitive)	N	N	30	25	Y	N	30	N	30	25	Y	25	Y
48	Utilities	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
42/43	Other trans, comm & util	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

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SLUCM* CODE	LAND USE CATEGORY	COMPATIBLE USE DISTRICTS												
		1	2	3	4	5	6	7	8	9	10	11	12	13
		L_{dn} 85	APZ I L_{dn} 80-85	APZ I L_{dn} 75-80	APZ I L_{dn} 70-75	APZ I L_{dn} 65-70	L_{dn} 80-85	L_{dn} 75-80	APZ II L_{dn} 80-85	APZ II L_{dn} 75-80	APZ II L_{dn} 70-75	APZ II L_{dn} 65-70	L_{dn} 70-75	L_{dn} 65-70
	<u>COMMERCIAL/RETAIL TRADE</u>													
51	Wholesale trade	N	Y[4]	Y[5]	Y[6]	Y	Y[4]	Y[5]	Y[4]	Y[5]	Y[6]	Y	Y[6]	Y
52	Building materials-retail	N	Y[4]	Y[5]	Y[6]	Y	Y[4]	Y[5]	Y[4]	Y[5]	Y[6]	Y	Y[6]	Y
53	General merchandise-retail	N	N	N	N	N	N	30	N	30	25	Y	25	Y
54	Food-retail	N	N	N	N	N	N	30	N	30	25	Y	25	Y
55	Automotive, marine	N	N	30	25	Y	N	30	N	30	25	Y	25	Y
56	Apparel & accessories - retail	N	N	N	N	N	N	30	N	30	25	Y	25	Y
57	Eating & drinking places	N	N	N	N	N	N	30	N	N	N	N	25	Y
58	Furniture, home furnishing retail	N	N	30	25	Y	N	30	N	30	25	Y	25	Y
59	Other retail trade	N	N	N	N	N	N	30	N	30	25	Y	25	Y
	<u>PERSONAL & BUSINESS[8] SERVICES</u>													
61	Finance, insurance &[8] real estate	N	N	N	N	N	N	30	N	30	25	Y	25	Y
62	Personal services .	N	N	N	N	N	N	30	N	30	25	Y[1]	25	Y
63	Business services	N	N	N	N	N	N	30	N	30	25	Y	25	Y
64	Repair services	N	Y[4]	Y[5]	Y[6]	Y	Y[4]	Y[5]	Y[4]	Y[5]	Y[6]	Y	Y[6]	Y
66	Contract construction services	N	N	N	N	N	N	30	N	30	25	Y	25	Y

This table is a guide. Adaptations to fit local conditions and more precise land use category designations are required based on the criteria of the foregoing narrative.

LAND USE COMPATIBILITY GUIDELINES

LAND USE COMPATIBILITY GUIDELINES

SLUCM* CODE	LAND USE CATEGORY	COMPATIBLE USE DISTRICTS												
		1	2	3	4	5	6	7	8	9	10	11	12	13
		L_{dn}	APZ I L_{dn} 80-85	APZ I L_{dn} 75-80	APZ I L_{dn} 70-75	APZ I L_{dn} 65-70	L_{dn} 80-85	L_{dn} 75-80	APZ II L_{dn} 80-85	APZ II L_{dn} 75-80	APZ II L_{dn} 70-75	APZ II L_{dn} 65-70	L_{dn} 70-75	L_{dn} 65-70
	PERSONAL & BUSINESS[8] SERVICES (Cont)													
	Indoor recreation services	N	N	N	N	N	N	30	N	30	25	Y	25	Y
69	Other services	N	N	N	N	N	N	30	N	30	25	Y	25	Y
	PUBLIC & QUASI PUBLIC SERVICES													
67	Government services	N	N	N	N	N	N	30	N	30[8]	25[8]	Y[8]	25	Y
68	Education services	N	N	N	N	N	N	N	N	N	N	N	30	25
711	Cultural activities incl churches	N	N	N	N	N	N	N	N	N	N	N	30	25
651	Medical & other health services[9]	N	N	N	N	N	N	N	N	N	N	N	30	25
624	Cemeteries	Y	Y[4,10]	Y[5,10]	Y[6,10]	Y[10]	Y[4]	Y[5]	Y[4,10]	Y[5,10]	Y6,10	Y10	Y6	Y
69x	Non profit organization	N	N	N	N	N	N	N	N	N	N	N	30	25
	Other public and quasi-public services	N	N	N	N	N	N	N	N	N	30	25	30	25
	OUTDOOR RECREATION													
761x	Playgrounds, neighborhood parks	N	N	N	N	N	N	N	N	N	Y	Y	Y	Y
762x	Community & regional	N	N	N	Y[11]	Y[11]	N	N	N	N	Y	Y[11]	Y[11]	Y

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LAND USE COMPATIBILITY GUIDELINES

SLUCM* CODE	LAND USE CATEGORY	COMPATIBLE USE DISTRICTS												
		1	2	3	4	5	6	7	8	9	10	11	12	13
		L_{dn} 85	APZ I L_{dn} 80-85	APZ I L_{dn} 75-80	APZ I L_{dn} 70-75	APZ I L_{dn} 65-70	L_{dn} 80-85	L_{dn} 75-80	APZ II L_{dn} 80-85	APZ II L_{dn} 75-80	APZ II L_{dn} 70-75	APZ II L_{dn} 65-70	L_{dn} 70-75	L_{dn} 65-70
	OUTDOOR RECREATION (Cont)													
712	Nature exhibits	N	N	N	N	Y	N	N	N	N	N	Y	N	Y
722	Spectator sports incl arenas	N	N	N	N	N	N	N	N	N	N	N	N	Y
741x	Golf course[12] riding stables[13]	N	N	Y[14]	Y[15]	Y	N	Y[14]	N	Y[14]	Y[15]	Y	Y[15]	Y
743/ 744	Water based recreational areas	N	N	Y[14]	Y[15]	Y	N	Y[14]	N	Y[14]	Y[15]	Y	Y[15]	Y
75	Resort & group camps	N	N	N	N	N	N	N	N	N	N	N	Y	Y
721x	Auditoriums, concert halls	N	N	N	N	N	N	N	N	N	N	N	N	Y
721x	Outdoor amphitheaters, music shells	N	N	N	N	N	N	N	N	N	N	N	N	N
	Other outdoor recreation	N	N	N	Y[11]	Y[11]	N	N	N	N	Y	Y	Y	Y
	RESOURCE PRODUCTION, EXTRACTION, & OPEN SPACE													
81	Agriculture (except live-stock)	Y[17]	Y[17]	Y[17]	Y[18]	Y[19]	Y[17]	Y[17]	Y[17]	Y[17]	Y[18]	Y[19]	Y[18]	Y[19]
815/ 817	Livestock farming, animal breeding	N	N	Y[17]	Y[18]	Y[19]	N	Y[17]	N	Y[17]	Y[18]	Y[19]	Y[18]	Y[19]
83	Forestry activities	Y[17]	Y[17]	Y[17]	Y[18]	Y[19]	Y[17]	Y[17]	Y[17]	Y[17]	Y[18]	Y[19]	Y[18]	Y[19]

This table is a guide. Adaptations to fit local conditions and more precise land use category designations are required based on the criteria of the foregoing narrative.

LAND USE COMPATIBILITY GUIDELINES

SLUCM* CODE	LAND USE CATEGORY	COMPATIBLE USE DISTRICTS												
		1	2	3	4	5	6	7	8	9	10	11	12	13
		Ldn 85	APZ I Ldn 80-85	APZ I Ldn 75-80	APZ I Ldn 70-75	APZ I Ldn 65-70	Ldn 80-85	Ldn 75-80	APZ II Ldn 80-85	APZ II Ldn 75-80	APZ II Ldn 70-75	APZ II Ldn 65-70	Ldn 70-75	Ldn 65-70
	<u>RESOURCE PRODUCTION, EXTRACTION, & OPEN SPACE (Cont)</u>													
84	Fishing activities & related services	Y	Y[11]	Y[11]	Y[11]	Y[11]	Y	Y	Y	Y	Y	Y	Y	Y
85	Mining activities	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
91	Permanent open space	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
93	Water areas	Y	Y[11]	Y[11]	Y[11]	Y[11]	Y	Y	Y[11]	Y[11]	Y[11]	Y[11]	Y	Y

This table is a guide. Adaptations to fit local conditions and more precise land use category designations are required based on the criteria of the foregoing narrative.

NOTES

N (NO)	-	The land use and related structures are not compatible.
Y (YES)	-	The land use and related structures are compatible without restriction and should be considered.
Y^x (YES WITH RESTRICTIONS)	-	The land use and related structures are generally compatible; however, some special factors should be considered.
35, 30 or 25	-	The land use is generally compatible; however, a Noise Level Reduction of 35, 30 or 25 should be incorporated into the design and construction of the structure.
35^x, 30^x or 25^x	-	The land use is generally compatible with NLR; however, such NLR does not necessarily solve noise difficulties and additional evaluation is warranted.
1	-	Because of accident hazard potential, the residential density in these CUD's should be limited to the maximum extent possible. It is recommended that residential density not exceed one dwelling unit per acre. Such use should be permitted only following a demonstration of need to utilize this area for residential purposes.
2	-	Although it is recognized that local conditions may require residential uses in these CUD's, this use is strongly discouraged in CUD's 10 and 12 and discouraged in CUD's 11 and 13. The absence of viable alternative development options should be determined and an evaluation indicating that a demonstrated community need for residential use would not be met if development were prohibited in these CUD's should be conducted prior to approvals.

Where the community determines that residential uses must be allowed Noise Level Reductions (NLR) of at least 30 (CUD's 10 and 12) and 25 (CUD's 11 and 13) should be incorporated into building codes and/or individual approvals. Additional consideration should be given to modify the NLR levels based on peak noise levels. Such criteria will not eliminate outdoor environment noise problems and, as a result, site planning and design should include measures to minimize this impact particularly where the noise is from gound level sources.

3 - Because these uses vary considerably by locality and within a general category, particular care should be taken to evaluate and modify guidelines to fit local conditions. Among factors to be considered: labor intensity, structural coverage explosive inflammable characteristics, size of establishment, people density, peak period (including shopper/visitors) concentrations.

4 - A NLR of 35 should be incorporated into the design and construction of portions of these buildings where the public is received, office areas or where the normal noise level is low.

5 - A NLR of 30 should be incorporated into the design and construction of portions of these buildings where the public is received, office areas or where the normal noise level is low.

6 - A NLR of 25 should be incorporated into the design and construction of portions of these buildings where the public is received, office areas or where the normal noise level is low.

7 - No structures in Clear Zone, no passenger terminals, and no major ground transmission lines in Clear Zones or APZ I.

8 - Low intensity office uses only (limited scale of concentration of such uses). Meeting places, auditoriums, etc. not recommended.

9 - Excludes hospitals.

10 - Excludes chapels.

11 - Facilities should be low intensity.

12 - Clubhouse not recommended.

13 - Concentrated rings with large classes not recommended.

14 - A NLR of 30 should be incorporated into buildings for this use.

15 - A NLR of 25 should be incorporated into buildings for this use.

16 - No structures in Clear Zone.

17 - Residential structures should not be permitted.

18 - Residential buildings should require a NLR of 30.

19 - Residential buildings should require a NLR of 25.

* SLUCM: STANDARD LAND USE CODING MANUAL: A standard system for identifying and coding land use activities. Department of Commerce 1965.

APPENDIX E

AF Regulation 55-34

REDUCING FLIGHT DISTURBANCES THAT CAUSE ADVERSE PUBLIC REACTIONS

APPENDIX E

DEPARTMENT OF THE AIR FORCE
Headquarters US Air Force
Washington DC 20330

AF REGULATION 55-34

22 November 1974

Operations

REDUCING FLIGHT DISTURBANCES

This regulation establishes practices to minimize the disturbances of flight operations that might cause adverse public reaction. It provides the commanders of all flying units with general guidance for dealing with local problems.

1. Importance of Good Community Relations. Mutual respect and appreciation for the Air Force mission and the health, safety, and welfare of the public are important factors in flying operations. Public reaction to annoyances caused by aircraft operations creates pressure to restrict such operations if they are considered a major invasion of the public domain. Maintaining good community relations by insuring that the public is continually informed about the flying mission eases such pressures.

2. Keeping the Public Informed. An understanding of the importance of flight operations to the overall efficiency of the Air Force can help reduce adverse public reaction to the annoyances created by these activities. Commanders can further this understanding by stressing in their information programs the value of their base flight operations. These programs should also explain the measures taken to hold to a minimum all disturbances to the neighboring civilian communities in addition to communities in the local flying area.

3. Protection of Civilian Communities. Commanders must take every precaution to protect communities near Air Force bases from major invasions of the public domain through annoyances and risks associated with flight operations. Commanders should:

a. Continually review existing traffic patterns, instrument approaches, low altitude operations and other aircraft operating practices, and evaluate these factors in terms of the location of the base in relation to populated areas and local situations.

b. Establish the following program at each applicable base to disseminate information concerning low altitude route activities (reference AFR 55-24). The originating unit of the low altitude route concerned must insure accomplishment of these tasks.

(1) Develop an explanatory letter outlining the purpose, routes, altitude, and time of use of low altitude routes. Use reproduced charts, photographs, and motion picture film for visual clarification.

(2) Forward the explanatory letter and appropriate visual materials to active civil and military airfields within 20 NM of route centerline (10 NM for operations conducted below 300 KIAS), all interested military commands, local FAA offices and local community and state officials.

(3) Prepare news releases pertaining to new low altitude routes. Disseminate news releases with visual materials through media outlets that cover the areas involved. (This requirement may be waived by major commands if it is determined to be detrimental to existing community relations).

(4) Disseminate follow-on news releases to appropriate media outlets explaining low altitude operations and the routes being flown. Releases should be based upon the frequency that these low altitude routes are used. In no case should reporting be less than semiannually.

c. Establish and maintain an active Air Installation Compatible Use Zone (AICUZ) program. This should achieve maximum feasible land use compatibility between air installations and neighboring communities in accordance with policy and guidance issued by HQ USAF/PRE.

d. Use the checklist below in planning the maximum protection for civilian communities. Commanders

Supersedes AFR 55-34, 14 February 1972. (For summary of revised, deleted, or added material, see signature page.)

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are also urged to take any other action they consider advisable to carry out the purpose of this regulation.

Preferential Runways

Minimum requirements for the use of a preferential runway system are:

(1) Visual Flight Rules (VFR) must be in effect.

(2) The wind is within 80 degrees of the runway heading with a velocity of 13 knots or less.

(3) The wind is within 90 degrees of the runways with a velocity of 5 knots or less.

(4) The runway is dry and clear.

(5) There are no obstructions adjacent to the runway.

(6) The individual pilot concurs.

Traffic Patterns

Establish to avoid populated areas as much as possible.

Take-Off Techniques

Establish departure procedures consistent with sound safety practices that will minimize adverse noise disturbances on the surrounding community. As a guide, procedures should require pilots of turbine-powered aircraft or a large aircraft (12,500 lbs or more), to climb to an altitude of 1,500 feet above the surface as rapidly as practicable.

Landing Techniques

Aircraft flying the VFR traffic pattern should not descend below the altitude established for the traffic pattern they are flying until necessary to insure a safe landing. Aircraft making a straight-in approach should maintain at least 1,500 feet above the terrain for as long as practicable before starting a normal descent on the final approach.

Run-Up Pads

Should be located to minimize disturbances and risk of accident. Engine run-ups, other than preflight, should be completed in areas specifically authorized for that purpose and within established limitations; such as prescribed heading, maximum allowable power setting, and so forth. Blast fences and other protective devices should be used as much as practicable. Maximum use of sound suppression devices should be made to reduce the noise from ground run-ups.

Engine Test Stands

Should be located to minimize disturbance. Hours of use may be regulated. Maximum use of sound suppression devices should be made to reduce the noise from ground run-ups.

Chaff Dispensing

To preclude the potential hazards to life and property involved when "rope" elements of chaff are dropped over high voltage electric transmission lines, the following restrictions will be observed:

(1) Chaff containing rope elements will not be dispensed during peacetime unless given special authorization by the major command headquarters having jurisdiction. Major commands may authorize dispensing of rope-chaff for tests and tactics requirements and for research and development requirements. Dispensing of rope-chaff will not be authorized for routine training sorties or unit simulated combat missions.

(2) Special permission is required from the Royal Canadian Air Force (RCAF) before dispensing rope-chaff over Canada.

(3) When special authority is granted, the organization concerned will take precautionary measures to insure that the rope-chaff falls on water areas or on land areas devoid of high voltage electric power transmission lines. Computation of "safe areas" for each sortie will consider the following:

(a) The geographical features of the area over which rope-chaff is to be dispensed.

(b) The effect winds aloft will have on the rope-chaff, during the time it descends from the dispensed altitudes to the surface.

(c) The rate of fall of rope-chaff.

(d) Allowances required to compensate for possible errors in computing "safe areas."

(4) Final responsibility for dispensing rope-chaff during peacetime rests with the aircraft commander, who will insure that the chaff is not dispensed from his aircraft unless the above provisions are met.

Low Altitude Operations

Refer to AFR 55-24 (FAA Handbook 7610.4) and DOD Flight Information Publications (FLIP), Planning, section IIA.

e. Supersonic operations:

(1) Conduct supersonic flights at altitudes above 30,000 feet over land areas, and above 10,000 feet over open water areas (at least 15 NM from the nearest shoreline).

(2) Avoid metropolitan areas (100,000 or more population), National Parks, and HQ USAF specified critical areas by one-half (½) NM for each 1,000 feet of flight altitude up to a maximum of 30 NM.

(a) Exception: JCS-approved SAC/NORAD exercises at a flight altitude of 39,000 feet, or above; may come to within seven (7) NM of the near edge of the above areas.

(b) Avoid less populated areas if practicable.

(3) Waiver requests must be forwarded through major command channels to HQ USAF/XOOFSA (AUTOVON 225-7498), if mission essential operational requirements dictate noncompliance with the above supersonic flight criteria. Notify HQ USAF/XOOFSA as soon as practicable after the fact if a waiver request is not feasible because of time sensitive mission requirements. Major commands must insure compliance with AFR 19-2 prior to submitting waiver requests for

HQ USAF approval. Sonic booms will not be generated except for:

(a) JCS-approved SAC/NORAD exercises and only to the extent required to achieve command objectives.

(b) ADC flights engaged in active air defense scrambles.

(c) Tactical missions which necessitate supersonic speeds.

(d) Phases of formal training courses and proficiency flights which require supersonic speeds. They will be conducted over specifically designated areas. Coordinate areas established in airspace under Federal Aviation Administration (FAA) jurisdiction with the Air Force Representative (AF Rep) to the FAA in the affected FAA region(s). Refer to AFR 55-2.

(e) Research, test and operational suitability test flights which require supersonic speeds. These flights must be conducted over areas designated for this purpose. Coordinate areas established in airspace under FAA jurisdiction with the AF Rep to the FAA in the affected FAA region(s). Refer to AFR 55-2.

(f) Those flights authorized by a major command for demonstration purposes. Coordinate demonstrations with HQ USAF (SAF/OI) at least 5 workdays in advance.

(g) An emergency when, in the judgment of the pilot, safety justifies a deviation from this general policy.

4. Sonic Boom Reporting System. The characteristics of sonic booms are such that damage to property may result. The Air Force must accept responsibility for restitution and payment of just claims if a civilian area has been affected by an Air Force or Air National Guard aircraft. The Staff Judge Advocate (SJA) investigates such claims or complaints. To assist in these investigations, USAF has established a Sonic Boom Reporting System. Commanders of USAF and ANG units operating aircraft capable of supersonic flight, will insure that reports of all flight activity at or above MACH 1 are recorded on AF Form 121, "Sonic Boom Log," according to the procedures published in AFM 55-354.

a. Five Consolidated Sonic Boom Logs (CONSOLOGS) are established to maintain reports of supersonic flight activity within specific geographic areas. Those areas and the major commands responsible for the CONSOLOGS serving them are:

(1) ALASKAN CONSOLOG – 55°00' thru 75°00' North Latitude and 130°00' thru 170°00' West Longitude.

(2) PACAF CONSOLOG – 50°00' South thru 45°00' North Latitude and 150°00' West thru 60°00' East Longitude.

(3) SOUTHERN CONSOLOG – 55°00' thru 14°50' South Latitude and 34°00' thru 92°00' West Longitude.

(4) USAFE CONSOLOG – 35°00' South thru 75°00' North Latitude and 59°59' East thru 20°00' West Longitude.

(5) HQ USAF CONSOLOG – a computerized CONSOLOG will be operated by HQ USAF for the area 15°00' thru 75°00' North Latitude and 52°00' thru 129°59' West Longitude.

b. Within the perimeters of the HQ USAF CONSOLOG, AF Forms 121 will be prepared by the pilot, his designated representative or the base operations officer at the first USAF base of landing following supersonic flight; or, when at the home base of the aircraft, by the appropriate flight operations unit. AF Forms 121 will be prepared, checked, and processed according to AFM 55-354.

(1) Mail the completed AF Form 121 to the flying unit to which the involved aircraft is assigned. This information must be keypunched and verified. Mail the AF Form 121 no later than 7 workdays from initial report.

(2) AF Forms 121 will be held for 30 days by the operations unit to which the aircraft is assigned to insure that errors detected during HQ USAF processing can be corrected by the responsible operations unit.

c. Within the perimeters of the Alaskan, PACAF, Southern and USAFE CONSOLOG areas, AF Forms 121 will be prepared and the information transmitted by electrical means to the DCS/Operations for the major command involved, marked: "ATTENTION: CONSOLOG." The original AF Form 121 will be mailed to the same addressee.

(1) Supersonic activity report messages received by the DCS/Operations will be filed chronologically in the command CONSOLOG. Upon receipt of the original AF Form 121, the message will be discarded and the AF Form 121 retained as the CONSOLOG entry.

(2) AF Forms 121, filed in the CONSOLOG, will be searched by the operations staff and MAJCOM SJA to answer queries for information on supersonic activity. Operations staff responsibilities are limited to receipt and filing of CONSOLOG entries and assisting with plotting and matching operational data.

(3) CONSOLOG reports will be retained in files for 30 months following receipt.

d. An SJA needing supersonic activity information will document the date, time, and location of an incident and request a search of the appropriate CONSOLOG as follows:

(1) Inquiries to the HQ USAF CONSOLOG will use an AF Form 128, keypunched and computer edited as detailed in AFM 55-354. Inquiry cards are transmitted weekly to HQ USAF where a computer program provides a listing of any coincident Department of Defense supersonic activity. The listing is forwarded to the originating base through the office of HQ USAF/JACC.

(2) Transmit inquiries for other CONSOLOGs by electrical means to the SJA of the appropriate major command detailed in paragraph 4a(1) through

(4). The MAJCOM SJA, assisted by the operations staff, will search for and list all supersonic tracks passing within $\pm 1^{\circ}$ of the location of the reported incident. Include all such activity reported during the period from 12 hours before, until 12 hours following the reported time of the incident. Return listings to the requesting SJA. If no coincident activity is found, the inquiry message must be held at the CONSOLOG for 30 days and all new reports checked for correlation.

5. Preparation of AF Forms 121 and 128. All supersonic activity within the perimeters of the areas listed in paragraph 4a will be reported except:

a. AF Form 121 will not be required for:

(1) Flights where all supersonic activity is over open water areas and no portion comes within 50 miles of a coastline or an inhabited island, or

(2) Supersonic activity which is part of a combat or combat support mission.

b. AF Form 128 will be required only for inquiries within the HQ USAF CONSOLOG area. Use message forms in other CONSOLOG areas.

6. Functional User's Manual. The procedures directed in this regulation are described in detail in AFM 55-354. Operations, Staff Judge Advocate, and other functional users reporting supersonic activity or preparing CONSOLOG inquiries will refer to AFM 55-354 for specific instructions. The manual also tells how to obtain field assistance with problems encountered in system operation.

7. Need for Accuracy and Responsiveness. Identification of Department of Defense aircraft causing sonic booms permits the investigating SJA to confirm USAF responsibility. And, to obtain aircraft and flight data useful for computing the approximate magnitude of sonic booms. Where flight data are classified, the system provides the minimum information needed to identify the flight and home base to be contacted. Prompt submission of accurate reports of supersonic activity enables the SJA to conduct an immediate investigation and, where warranted, assist in an early settlement for just claims.

8. Keeping Pilots Informed. Copies of this regulation and any other directive, standard operating procedure, or other announcement dealing with efforts to carry out its purpose must be made a permanent part of all pilot information files.

BY ORDER OF THE SECRETARY OF THE AIR FORCE

OFFICIAL

DAVID C. JONES, General, USAF
Chief of Staff

JACK R. BENSON, Colonel, USAF
Director of Administration

SUMMARY OF REVISED, DELETED, OR ADDED MATERIAL

This revision requires commanders to disseminate information on low altitude route activities (para 3b); refers commanders to AICUZ guidance provided by HQ USAF/PRE (para 3c); modifies supersonic flight rules to limit to 30 NM the distance that sensitive areas must be avoided (para 3e); requires that major commands comply with AFR 19-2 prior to submitting requests to HQ USAF for waiver to supersonic flight rules (para 3e); and requires that special areas designated for supersonic training and test flights be coordinated with the Air Force Representative to the appropriate FAA region (paras 3e(4) and (5)).

APPENDIX F

METHODOLOGY FOR DETERMINING THE
MPACT OF URBANIZATION ON THE CRUTCHO CREEK DRAINAGE BASIN

APPENDIX F. METHODOLOGY FOR DETERMINING THE IMPACT OF URBANIZATION ON THE CRUTCHO CREEK DRAINAGE BASIN

To examine the effect of the proposed housing on flooding in the Crutcho Creek drainage basin, a relationship between urbanization and flood discharge developed by the U.S. Geological Survey (USGS), Oklahoma City, Oklahoma was applied to Crutcho Creek [F1, F2].

F.1 DRAINAGE AREA, MAIN CHANNEL SLOPE, ANNUAL PRECIPITATION

The drainage area for Crutcho Creek upstream of Vandenberg Street was delineated and measured as shown in Figure 4.6.2-A. This area includes the site of the proposed family housing, designated Location 1. The main channel slope was obtained from the USGS topographic map of Midwest City. Annual precipitation for the area of Midwest City was obtained from USGS publication 23-74 [F1].

F.2 PEAK FLOOD DISCHARGE (Q_x)

The peak flood discharge (Qx) equations used the the USGS for Oklahoma streams [F3] in natural drainage basins are:

$$Q_2 = 0.0568 \cdot A^{0.67} \cdot S^{0.37} \cdot P^{2.00}$$

$$Q_{10} = 1.081 \cdot A^{0.67} \cdot S^{0.42} \cdot P^{1.44}$$

$$Q_{50} = 5.40 \cdot A^{0.69} \cdot S^{0.47} \cdot P^{1.12}$$

$$Q_{100} = 9.14 \cdot A^{0.70} \cdot S^{0.48} \cdot P^{1.01}$$

where Q_x is the annual peak discharge for the specified year recurrance interval x, in cubic feet per second (cfs).

A is the drainage area of the main stream, in this case Crutcho Creek shown in Figure 4.6.2-A, in square miles.

S is the main channel slope between 10% and 85% of the main channel length in feet per mile.

P is annual precipitation for the drainage basin, in inches.

Derived:

A–The contributory drainage area of Crutcho Creek measured approximately 10.7 square miles.

S-The main channel slope of Crutcho Crrek was calculated to be approximately 19.9 feet per mile.

P-Mean annual precipitation for this area was given by the USGS as 31 inches.

With these values, the magnitude and frequency of floods on Crutcho Creek were calculated as follows:

$$Q_2 = 0.0568 \cdot 10.7^{0.67} \cdot 19.9^{0.37} \cdot 31.^{2.00} = 808.\ \text{cfs}$$

$$Q_{10} = 1.081 \cdot 10.7^{0.67} \cdot 19.9^{0.42} \cdot 31.^{1.44} = 2610.\ \text{cfs}$$

$$Q_{50} = 5.40 \cdot 10.7^{0.69} \cdot 19.9^{0.47} \cdot 31.^{1.12} = 5290.\ \text{cfs}$$

$$Q_{100} = 9.14 \cdot 10.7^{0.70} \cdot 19.9^{0.48} \cdot 31.^{1.01} = 6466.\ \text{cfs}$$

These discharge values do not reflect urbanization effects on the basin. The development of a housing area within the drainage basin will result in an increase in man-made impervious surfaces that will affect flood runoff. Paved roadways decrease infiltration and increase the rate of runoff into nearby streams, increasing the peak discharge. (See Figure F-1).

F.3 URBAN PEAK FLOOD DISCHARGE (Q_x urban)

The USGS has developed an approach for estimating flood discharges which incorporate urbanization. The "Leopold factor", R_L, is an adjustment to account for impervious surfaces and storm sewered areas associated with urban development. The general form of the equation is:

$$Q_{X\ urban} = \frac{7R_xQ_2\ (R_L-1)}{6} + \frac{Q_x\ (7-R_L)}{6} \quad [F1]$$

where $Q_{X\ urban}$ is the urban peak discharge for an x-year recurrance interval.

R_L is the Leopold factor accounting for urbanization based on percent impervious surface and storm sewered areas.

Q_x is the natural peak discharge for a recurrance interval, x.

Q_2 is the mean annual flood discharge for natural basins.

R_x is the rainfall intensity ratio for a recurrance interval, x.

F.4 PEAK FLOOD DISCHARGE OF CRUTCHO CREEK

Estimates of peak discharges for Crutcho Creek which incorporated the proposed housing development were calculated.

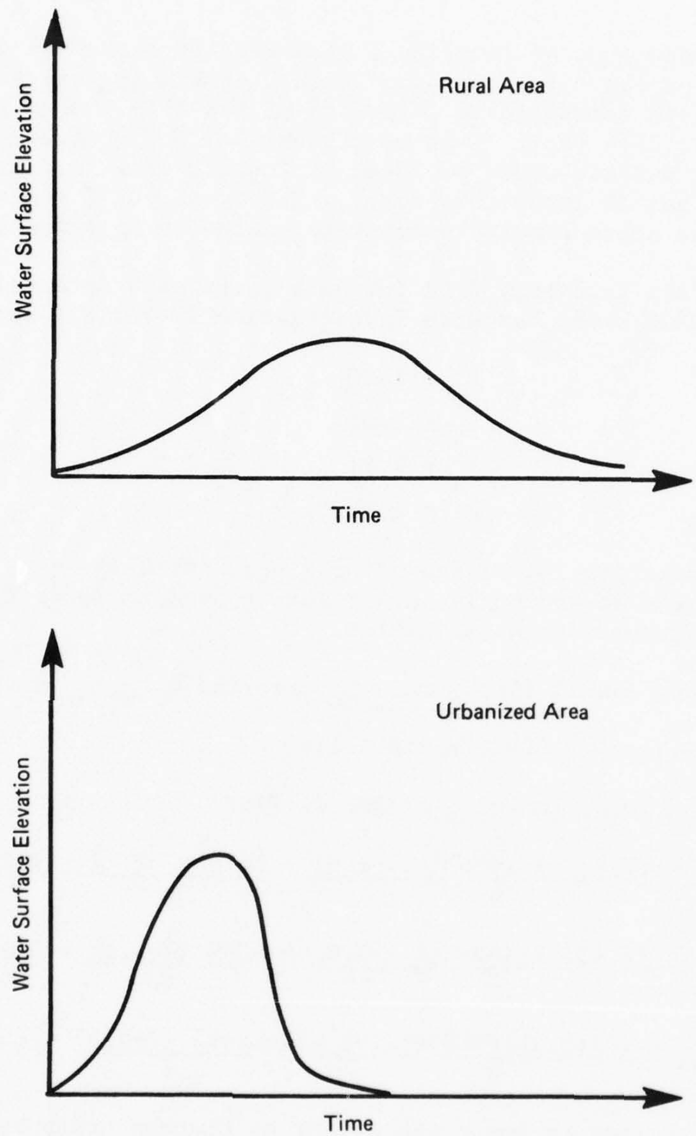

FIGURE F–1 PEAK DISCHARGE CHANGE AS A RESULT OF URBANIZATION OF AN AREA

Derived:

R_L - The land area of location 1 measured approximately 4,267,000 square feet (15% of the total drainage basin). Resulting man-made impervious surfaces were esimtated to cover 50% of the site, based on an index by Stankowski, 1974 [F3]. This meant that 2,133,500 square feet of 7.7% impervious surface would be added to Crutcho Creek drainage basin, which presently has 3% impervious cover. The total 10.7% impervious surface and similar storm sewered percentage yields an R_L value of 1.1.

R_x - Rainfall intensity data for an x-recurrance interval is given by Sauer in USGS Water Resource Investigation 23-74 [F1] as:

Q_2	$R_x = 1.00$
Q_{10}	$R_x = 1.60$
Q_{50}	$R_x = 2.11$
Q_{100}	$R_x = 2.33$

Finally, substitution of the natural peak discharge data for Crutcho Creek derived at the beginning of this appendix yields the following peak discharges with urbanization.

For the mean annual flood, $Q_{2\ urban}$ we find $Q_{2\ urban} = R_L Q_2$

$Q_{2\ urban} = (1.1) \cdot 808$ cfs = 889 cfs

For the Q_{10}, Q_{50}, and Q_{100} floods we find

$$Q_{10\ urban} = \frac{(7)(2.11)(808)(1.1-1.0)}{6} + \frac{2610\ (7-1.1)}{6} = 2716 \text{ cfs}$$

$$Q_{50\ urban} = \frac{(7)(2.11)(808)(1.1-1.0)}{6} + \frac{5290\ (7-1.1)}{6} = 5401 \text{ cfs}$$

$$Q_{100\ urban} = \frac{(7)(2.33)(808)(1.1-1.0)}{6} + \frac{6466\ (7-1.1)}{6} = 6578 \text{ cfs}$$

These discharges estimate the effect on Crutcho Creek by the proposed development. Only a 10% increase in discharge (81 cfs) is seen in the mean annual flood. According to USGS officials in Oklahoma, the amount of impervious cover must exceed 15% before a signficiant change in stream discharge occurs.*

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* Personal Communication, Will Thomas, USGS, Oklahoma City, Oklahoma, January 3, 1975.

REFERENCES

F1 Sauer, V.B.,"An Approach to Estimating Flood Frequency for Urban Areas in Oklahoma." Oklahoma City, Oklahoma: U.S. Geological Survey, Water Resources Investigations 23-74, July 1974.

F2 Sauer, V.B.,"Flood Characteristics of Oklahoma Streams." Oklahoma City, Oklahoma: U.S. Geological Survey, Water Resources Investigations 52-73, January 1974.

F3 Stankowski, S.J., "Magnitude and Frequency of Floods in New Jersey with Effects of Urbanization." New Jersey: U.S. Geological Survey, Water Resources Division, 1974.

APPENDIX G

FLYING
TRAFFIC CONTROL AND FLIGHT OPERATIONS

APPENDIX G

DEPARTMENT OF THE AIR FORCE
HQ Oklahoma City Air Logistics Center (AFLC)
HQ Tinker Air Force Base (AFLC)
Tinker Air Force Base OK 73145

OKLAHOMA CITY ALC–
TAFB REGULATION 60–1
9 May 1975

Flying
TRAFFIC CONTROL AND FLIGHT OPERATIONS

This regulation prescribes traffic control and flight operations procedures for Tinker Air Force Base. The provisions of this regulation are directive upon all assigned and attached units and aircrews and those off-base organizations serviced by Base Operations and Training Division (2854 ABG/OT). Pilots may deviate from the procedures contained herein in the interest of flying safety or when directed by Fort Worth Air Route Traffic Control Center (ARTCC), Tinker Tower, Oklahoma City Approach Control or Tinker Precision Approach Radar (PAR). (NOTE: All altitudes are mean sea level (MSL) unless otherwise indicated.)

CONTENTS

Supersedes Oklahoma City ALC–TAFBR 60–1, 30 May 1974. (See summary of revised, deleted, or added material below signature element.)
OPR: 2854 ABG/OT
DISTRIBUTION: F, X: AFLC/XOO. . .1

✱ Noise Abatement Paragraphs

Attachments Page

CHAPTER 1

AIRFIELD INFORMATION

1. GENERAL INFORMATION. Tinker Air Force Base has two operating runways. Runway 17/35 is 11,100 feet long and 200 feet wide. Runway 35 has a 1,167–foot paved overrun. Runway 17 has a 1,000-foot stabilized surface, low weightbearing overrun. Runway 12/30 is 7,842 feet long and 150 feet wide with a 728 foot stabilized surface, low weightbearing overrun at the southeast end only.

2. JET BARRIERS:

a. General. Aircraft will take-off and land toward the most compatible arresting system available. Unless specifically requested by the pilot concerned, all aircraft will take-off and land into a LOWERED MA–1A J–BAR (modified and/or interconnected). *EXCEPTION: During cold weather conditions when there is danger of equipment malfunctions, the MA-1A J-BAR may be left in the raised position. When this situation exists all pilots of tailhook-equipped aircraft will be so advised. When aircraft are landing with known or suspected radio failure, the departure end MA-1A J-BAR will be raised. NOTE: BAK-9 barrier on the approach end of runway in use is disconnected and removed to one side whenever scheduled training flights involving Det 507, 301st Tac Ftr Wg/465 TFS (AFRes) F-105 aircraft are in progress.*

b. Inspection of Jet Barriers. Whenever barriers are removed, repositioned, lowered, or raised on the runway overrun because of a runway change, emergency engagement or scheduled training flight(s) (see paragraph 2a note), Base Operations Branch (2854 ABG/OTB) will conduct an inspection to insure the barrier is in the desired position. Tinker Tower will be notified when the barrier has been inspected and runway is ready for use. See attachment 1 for J–BAR/A–GEAR types, locations, and distances.

3. RUNWAY/BARRIER CHANGE PROCEDURES:

a. Notification of Runway Change. When Tinker Tower determines a runway change is required, tower will notify Base Operations Branch. Base Operations Branch will coordinate with 301 TFW/465 TFS (AFRes) Operations and notify the Electric Power Production Section (2854 ABG/DEOP), Ext 7427, or radio call letters "CE–4", to change the barriers. The runway change will not be effected until completion of procedures in b(1) and b(2) below.

b. Barrier/Runway Change. J–BAR/A–GEAR arresting systems will be configured with the runway change in the following order:

(1) BAK–9 on departure end of runway 17/35 scheduled for use - - positioned for engagement.

(2) MA–1A on approach end of runway 17/35 scheduled for use - - disconnected.

(3) Tinker Tower will change runway in use after completion of procedures b(1) and b(2) above.

(4) Runway 17/35 approach end J–BAR/A–GEAR removal.

(a) MA–1A – Removed.

(b) BAK–9 – Disconnected and removed (if required to support F-105 operations).

(5) Tinker Tower will discontinue use of runway 12/30.

(6) MA–1A on departure end of runway 12/30 scheduled for use – positioned for use.

(7) MA–1A on approach end of runway 12/30 scheduled for use – disconnected and removed.

(8) Runway 12/30 may be used.

(9) MA–1A on departure end of runway 17/35 in use – positioned for use.

NOTE: Electric Power Production Section personnel changing barriers will maintain radio contact with Tinker Tower and advise them as procedures in b(1), (2), (4), (6), (7), and (9) above are completed. In turn, Tinker Tower will advise OTB of barrier configuration and the runway in use.

4. DANGEROUS CARGO LOADING/HOLDING AREA. (Reference TAFB Operation Plan (OPLAN) 55–14.)

a. The compass rose is the primary area for load/offload dangerous cargo (reference attachment 6, view A).

b. Taxiway III, west of engine test pads, is designated as the alternate dangerous cargo load/offload area. When dangerous cargo load/offload operations are in effect, base operations will close that section of the taxiway.

c. The air freight terminal parking ramp may be used to load/offload Class "B" dangerous cargo.

d. A Class "B" temporary holding area is located on the west side (midpoint) of taxiway II (reference attachment 6, view A).

5. RUNWAY RESTRICTIONS. Because of the runway width, B–52 aircraft operations are prohibited on runway 12/30.

6. DRAG CHUTE JETTISON/RECOVERY:

a. Jettison. The following procedures will apply:

(1) Low Wind/Dry Surface. Pilots will normally retain their drag chute to the parking ramp unless intra-unit procedures are established to effect immediate recovery.

(2) High Wind/Dry Surface. Pilots will clear the runway, turn their aircraft into the wind and release the chute downwind using caution to clear the aircraft movement surfaces.

(3) High Wind/Slick Surface. During inclement weather, when the runway/taxiways are wet or icy, the pilot may elect to jettison his chute at any point during the landing/taxi operation. If the pilot accepts this course of action, Tinker Tower/Ground Control should be immediately notified so that further operations in the area may be suspended until the chute is recovered.

b. Recovery. When notified by Tinker Tower of the approximate position of jettisoned chutes, Base Operations Branch will contact one of the following activities and request they expedite recovery action:

(1) Transient Alert Section (2854 ABG/MAOT). Transient Alert Section is responsible for recovery of all drag chutes jettisoned by transient aircraft. Recovery will be accomplished as soon as practical after landing.

(2) Services Section (Oklahoma City ALC/MABPC). The Services Section is responsible for recovery of drag chutes of flight test and Oklahoma City ALC delivery aircraft. Recovery will be accomplished as soon as practical and prior to subsequent flight test or delivery aircraft landings.

(3) 301 TFW/465 TFS (AFRes) Maintenance Squadron. The Maintenance Squadron is responsible for recovery of drag chutes of 465 TFS F–105 aircraft. Recovery will be accomplished as soon as practical after landing.

c. Tinker Tower. Directions to pilots or actions to take to recover drag chutes are as follows:

(1) Request transient aircraft pilots to retain deployed chutes to the parking area.

(2) Attempt to establish the location of each jettisoned chute to insure it is clear of aircraft movement areas. If the chute is not clear of active taxiways/runway or its position cannot be determined, close the taxiway/runway to further operations until recovery is accomplished.

(3) Approve taxi operations in the area of the jettisoned chute when the pilot(s) report the chute in sight and can safely taxi.

7. MOBILE CONTROL UNITS. Units are aligned to runways 17 and 35; 900 ft north and 200 ft west of runway 35 edge; and 1,000 ft south and 200 ft west of runway 17 edge. An officer assigned to 301 TFW/465 TFS (AFRes) will be present in the active unit during all F-105 local flying.

a. Mobile Control Officer. The mobile control officer will:

(1) Monitor the appropriate tower and/or PAR frequency in use and "guard" channel.

(2) Maintain radio silence at all times except to issue instructions to pilots of his own unit pertinent to the execution of a safe approach/landing.

(3) Function as directed by 301 TFW/465 TFS (AFRes) and coordinated with the Chief, Base Operations and Training Division (2854 ABG/OT).

(4) In the interest of flying safety, or upon request by the tower controller, assist in every way possible.

b. Tinker Tower. The tower crew chief will:

(1) If the situation warrants, request assistance from the mobile control officer.

(2) Prior to changing runways, give advance notice to the mobile control officer.

c. Emergency Air Traffic Control Tower. The Mobile Control Units and associated equipment are designated as emergency air traffic control facilities when manned by qualified AFCS air traffic control personnel. Above action may be necessary should the base Control Tower be temporarily placed out of commission.

CHAPTER 2

LOCAL FLYING AREA

8. GENERAL INFORMATION. HQ USAF has directed all flight operations be conducted according to instrument flight rules (IFR) to the maximum extent practicable without unacceptable mission derogation. Accordingly, areas have been designated to the east/southeast, west/southwest of Tinker AFB to conduct IFR and tactical maneuver training, functional check flights (FCF), fighter aircraft test flights, fighter bombing/gunnery training and an area to jettison external stores for aircraft in an emergency situation. Oklahoma City ALC flight test mission profiles are coordinated and approved by ARTCC; however, because of the great distance of some flights, they are omitted from the local flying area chart (attachment 5).

9. AREA DEFINED. That airspace 1,000 feet above ground level (AGL) up to but not including flight level 18,000 feet (FL 180) (see attachment 5). Full IFR flight procedures will prevail when operating within the positive controlled airspace with Air Traffic Control (ATC) approval mandatory.

a. Jet VFR Training Area. A jet VFR training area for flights 1,000 feet AGL up to but not including FL 180 is designated in the western portion of the Tinker AFB local flying area (see attachment 5).

b. IFR Training Areas. IFR training areas for Tinker AFB mission support, Oklahoma City ALC fighter test and tenant aircraft are as follows:

(1) Tinker AFB T–29 Aircraft. The T–29 IFR training and FCF area extends from the TIK TACAN 090°R south to the 115°R; beginning at 23 DME east to 33 DME; from 6,000 feet to 9,000 feet. Oklahoma City RAPCON (FAA) controllers will provide radar monitoring and traffic advisories within this area, work load permitting.

(2) Tinker AFB T-39 Aircraft. The T–39 IFR training and FCF area extends from the TIC TACAN 090°R south to the 115°R; beginning at 35 DME east to 55 DME; from 11,000 feet to 16,000 feet.

(3) Oklahoma City ALC Fighter Test Area. A portion of the Oklahoma City ALC flight test profile for fighter aircraft known as the "ASHER" test area is defined as follows:

34° 57' 30" N; 97° 04' 15" W
34° 53' 45" N; 96° 41' 15" W
34° 37' 45" N; 96° 56' 45" W
34° 37' 00" N; 97° 07' 15" W
34° 50' 30" N; 97° 15' 00" W

(4) "RIVERS" training area. A jet transition/aircraft manuevering area, 10,000 feet MSL up to and including FL 220, is defined as follows:

34° 49' 00" N; 95° 42' 30" W
35° 22' 00" N; 95° 03' 00" W
34° 51' 00" N; 95° 03' 00" W
34° 50' 00" N; 94° 40' 00" W
33° 57' 30" N; 95° 17' 45" W
34° 02' 20" N; 96° 00' 00" W

c. Oklahoma City ALC Flight Test Mission Profiles. Oklahoma City ALC flight test aircraft are authorized to operate along published routes as approved by Fort Worth ARTCC (see attachments 8 thru 12).

CHAPTER 3

VFR TERMINAL AREA PROCEDURES

10. TRAFFIC PATTERNS:

a. Direction of Traffic:

(1) Runways 17 and 30, left-hand traffic.

(2) Runways 12 and 35, right-hand traffic.

b. Rectangular Pattern. Enter and fly downwind at 2,300 feet. Maintain 2,300 feet until turning base leg. Avoid overflying Soldier Creek School at corner of Southeast 15th Street and Douglas Boulevard. (Light aircraft traffic pattern is 1,800 feet.) (See attachment 2, views A and B.)

c. Overhead Pattern. Enter initial approach at 2,800 feet. Maintain 2,800 feet until turning downwind. Avoid overflying Soldier Creek School at corner of Southeast 15th Street and Douglas Boulevard. (See attachment 2, views A and B.) ***NOTE: Overhead pattern will not be permitted when weather conditions are reported ceilings less than 2,000 feet and/or visibility less than 3 miles.***

11. VFR STRAIGHT-IN APPROACHES. With Control Tower approval, straight-in approaches may be made to any runway; however, the aircraft will not descend lower than 2,000 feet at a distance greater than 2 miles from the end of the runway.

12. PRACTICE CIRCLING APPROACHES TO RUNWAY 12/30. Practice circling approaches may be approved as traffic conditions permit. Aircraft making circling approaches to land, execute touch-and-go landings, or make low approaches to runways 12 or 30 will conform to the following (reference attachment 4):

a. Runway 17 Approach for Runway 12/30. Aircraft will make a low approach to runway 17, circle right or left to conform to normal traffic flow to complete the approach.

b. Runway 35 Approach for Runway 12/30. The pilot will terminate the approach to runway 35 approximately 1½ miles from the runway threshold to begin the right or left circling.

13. FLAMEOUT AND PRECAUTIONARY LANDING PATTERNS – ALL AIRCRAFT. Practice flameout landing patterns and precautionary landing patterns may be accomplished at Tinker AFB when:

a. Existing traffic conditions permit.

b. Control tower approval is received.

c. VFR conditions are maintained through the approach.

d. Radio calls are made at the high key, low key, and base leg or as requested by the Control Tower.

14. VFR DEPARTURE RESTRICTIONS. For noise abatement reasons, VFR departures from Tinker AFB runways are restricted as follows:

a. Runway 35 Departure:

(1) When departing the traffic pattern climb runway heading to 3,700 feet prior to executing turns.

(2) When remaining within the closed traffic pattern climb runway heading to 2,300 feet, passing the airfield boundary, prior to executing a right turn.

b. Runway 30 Departure. When departing runway 30 climb runway heading to 4,000 feet prior to executing a right turn. Left turns may be initiated at 1,800 feet.

15. HELICOPTER OPERATIONS. Helicopter operations at Tinker AFB are as follows:

a. Day Operations. Normally, all inbound helicopters will be directed to the helipad located northeast of the center section of runway 12/30 (see attachment 7). Day traffic patterns are: Left-hand traffic pattern for runway 30 and right-hand for runway 12. Altitude on downwind legs is 1,800 feet. Enter pattern on a 45° leg to intercept downwind leg opposite midpoint of runway. ***EXCEPTION:*** ***When the crosswind component exceeds the aircraft operating handbook capability to runway 12/30, the aircraft commander may, with Control Tower approval, utilize taxiway II. Touchdown will be made at the helipad.***

b. Night Operations. Night helicopter operations will be made only within clearly lighted areas. Normally, night landings will be conducted on the active runway or as directed by the tower. Night traffic patterns are: Standard rectangular pattern; left-hand for runways 17/30 and right-hand for runways 12/35. Altitude on downwind legs is 1,800 feet. Enter pattern on a 45° leg to intercept downwind leg opposite midpoint of runway.

c. Taxi Operations. Tinker Tower will direct helicopters landing at Tinker AFB to taxi only on designated aircraft movement areas.

d. Sod Touchdown Area. A sod, touchdown autorotation, practice area has been established northwest of taxiway XIV and outlined by 10 white painted tires (see attachment 7). Traffic pattern for this area is the same as for runway 12/30 (see paragraph 15a above).

16. CIVIL AIRCRAFT PRACTICE APPROACHES. An unsatisfactory flying safety condition could result if civil aircraft were authorized to practice approaches to Tinker AFB. Except for emergency situations and those civilian aircraft that are cleared by 2854 ABG/OT, practice approaches will not be authorized for civil aircraft.

CHAPTER 4

INSTRUMENT APPROACH AND DEPARTURE

17. SUCCESSIVE/MISSED APPROACHES:

a. If tower clearance has not been obtained, the practice approach will be terminated at the final approach fix inbound, or in no case later than 4 NM from the airport.

b. Upon executing missed approaches ***during VFR conditions*** fly runway heading climbing to 2,300 feet. After passing airfield boundary, comply with normal missed approach instructions.

18. APPROACH MONITORING:

a. ILS Approaches to Tinker AFB. PAR monitoring will be provided ILS approaches under any of the following conditions:

(1) The reported weather is below basic VFR minima.

(2) Night.

(3) Upon request of the pilot.

b. Approach Monitoring at Other Than Tinker AFB. Assigned and attached pilots will, whenever possible, request approach monitoring when executing an approach (other than PAR).

19. IFR DEPARTURE RESTRICTION. For noise abatement reasons all aircraft departing runway 35 will climb runway heading to 3,700 feet prior to executing turns.

CHAPTER 5

GROUND OPERATIONS

20. TAXI PROCEDURES (ALL AIRCRAFT):

a. Prior to Engine Start:

(1) Establish radio contact with Tinker Tower.

(2) Insure no vehicle is parked within 25 feet in front of the aircraft and vehicles parked at the side are clearly visible from the cockpit.

(3) Monitor Automatic Terminal Information Service (ATIS). (See IFR-Supplement (Enroute).) *CAUTION: Do not start aircraft engines if a fuel truck is within 100 feet immediately in front of or behind the aircraft.*

b. Taxi Instructions. Exercise caution when leaving the aircraft parking apron. When on open taxiways, taxi at a speed which will assure safe operations. (See taxi routes posted in the Flight Planning Room.)

NOTE: Taxiing aircraft have the right-of-way except for emergency response vehicles. Upon noting the approach of emergency vehicles, aircraft will stop and ground traffic will give way until emergency vehicles have passed.

21. TAXI RESTRICTIONS:

a. All Aircraft. Prior to taxi, permission will be obtained from Tinker Tower.

b. B–52 Aircraft. Because of taxiway/runway width, B–52 aircraft are prohibited from taxiing on taxiways I, II (south of taxiway XII), III, IV, V, XIV, and runway 12/30.

22. TOWING AIRCRAFT:

a. Runways. Unless the tug has an operable radio, aircraft being towed across any portion of the runway system will be preceded by a radio equipped vehicle. Constant communication will be maintained with Tinker Tower.

b. Taxiways/Ramp. Prior coordination will be effected with Base Operations Branch or Tinker Tower prior to towing aircraft on the taxiway system and the Area "A" transient aircraft parking ramp between the Air Freight Terminal (Bldg 260) and taxiway V.

23. "LAST CHANCE" INSPECTION. "Last Chance" inspections are performed on Oklahoma City ALC flight test fighter aircraft by personnel assigned to Oklahoma City ALC Directorate of Maintenance. "Last Chance" inspections are performed on F–105 aircraft by personnel assigned to the 301 TFW/465 TFS (AFRes). Inspection areas for runways 17/35 and 12/30 are depicted in attachment 6, view A. Prior to operating ground vehicles on the airfield, inspection personnel will:

a. Be briefed by the Base Operations personnel on the taxiway system, exit roads to be used after inspection has been performed, and procedures to follow when an emergency is in progress.

b. Maintain constant communication with Tinker Tower/Ground Control.

24. AIRCRAFT PARKING. Wing walkers will be used when the aircraft is taxied within 25 feet of an obstruction; however, wing walkers normally are not required when painted taxi lines exist to direct local aircraft parking. When encountering possible hazards to taxi operations, stop until ground assistance is available and it is safe to continue, or shut down engine(s) and request aircraft be towed to proper parking area.

25. C–5A SPECIAL HANDLING PROCEDURES. The unique size and characteristics of the C–5A aircraft require special handling procedures to avoid damage to the aircraft, airdrome facilities, vehicles and personnel.

a. C–5A Arrival Notification. Base Operations Branch is designated as the focal point for receiving and disseminating information regarding the arrival/departure of C–5A aircraft at Tinker AFB. (When ETA varies more than 30 minutes, revised ETA will be passed to affected activities.) Following activities are notified:

(1) Aerial Port Control Center. The Control Center is advised of the estimated time of arrival (ETA). Moreover, the center is requested to provide directions for aircraft parking.

(2) Tinker Tower. Air Traffic Control is advised of ETA, taxi route, parking spot, and direction of parking.

(3) Base Aircraft Maintenance Division (2854 ABG/MA) (Maintenance control and transient alert functions). Activities are advised of ETA, direction of parking and, if known, servicing requirements.

(4) Security Police Dispatcher. The dispatcher is advised of ETA and parking location.

b. C–5A Route Survey. Prior to ETA, Base Operations Branch personnel will drive over the entire taxi, aircraft parking route to insure it is free of foreign object damage (FOD) and obstructions; that material, equipment and personnel are removed or withdrawn to a safe distance so that engine thrust will not be a hazard.

c. Runway 17 Departure. Because of possible engine thrust damage to Bldg 245, C–5A aircraft will be held on taxiway XI, heading north, until departure spacing is established and take-off clearance is issued.

d. Ground Vehicles. Radio equipped vehicles, in communication with Tinker Tower/Ground Control will, when observed operating in close proximity to taxiing C–5A aircraft, be warned to avoid driving within 600 feet to the rear of the aircraft.

CHAPTER 6

EMERGENCY PROCEDURES

26. GENERAL INFORMATION. When an emergency is declared, either on the ground or in the air, it is imperative that Base Operations Branch be immediately notified so appropriate measures may be taken to avoid or minimize damage.

a. Primary Crash Alarm System. Tinker Tower will activate the primary crash net for any situation (actual or exercise) involving aircraft accidents/emergencies. All parties on the circuit will acknowledge receipt of messages by use of initials. Reactivation of the circuit will be accomplished to amend status of the emergency situation. *NOTE: Tinker Tower will test the primary crash alarm system daily between 0800 – 0900 hours. Malfunctions will be reported immediately to telephone maintenance.*

b. Secondary Crash Alarm System. Upon receipt of an alert or emergency/crash notice, normally passed by Tinker Tower, Base Operations Branch will automatically signal all recipients of the system. The type emergency/exercise will be identified and line items listed on AFLC Form 98, "Fire/Crash Emergency Data" will be read distinctly and chronologically. Personnel designated to receive the information will listen and copy without interruption. Parties on the net will acknowledge receipt of the message by use of initials. Information will be reaccomplished at the end of the transmission, if required.

c. Emergency Landing – Runway Inspection. After an emergency landing which could adversely affect runway conditions the runway will be closed to air traffic until inspected. Normal operations will be resumed upon receipt of directions by the Chief, OT, or his designated representative. When warranted, Chief, OT, or his designated representative, after coordinating with Tinker Tower, may waive runway inspection.

27. BARRIER ENGAGEMENTS:

a. Departure End Engagements. Departure end engagements are possible on all runways for tail hook equipped and conventional aircraft that are compatible with the MA-1A and/or MA-1A modified J–BAR/A–GEAR and BAK–9 A–GEAR barriers.

b. Approach–End Engagements:

(1) Runway 35. Normally runway 35 is used for all approach-end engagements. Tinker Tower will advise the pilot of the location of the BAK–9 A–GEAR (872 feet down the landing runway) and the location and type of other barriers installed on the approach end overrun.

(2) Runway 17. This runway is not equipped with barrier identification lights for night operations. Base Operations Branch will insure the MA–1A barrier on the north end is disconnected and removed prior to the aircraft beginning an approach. Tinker Tower will advise the pilot of the location of the BAK–9 A–GEAR (114 feet short of the runway on the overrun) and the length of overrun/type surface available (1,000 feet hard surface/stressed for landing).

28. FOAMING RUNWAY FOR EMERGENCY LANDINGS. Time permitting, foam may be applied to the runway for aircraft gear-up landings or for other emergency landings whereby damage to aircraft or danger of fire must be minimized. Upon receipt of notification of an aircraft in distress and landing at Tinker, the Chief, Base Operations and Training Division, or his designated representative may, depending upon the emergency situation, direct the application of foam on a runway. If this course of action is selected, the following procedures apply:

a. Fire/Crash Rescue. The officer in charge of fire/crash rescue will supervise the application of a foam pattern on the runway selected. Length and width of foam pattern will be as directed by the Chief, OT, or his designated representative.

b. Prior to Emergency Landing. Prior to emergency landing, every effort will be made by the fire department to have emergency vehicles used in foaming back in service.

c. After Emergency Has Terminated. After emergency has been terminated, the Chief, OT, or his designated representative will direct the removal of the foam and return the runway to service as expeditiously as possible.

29. AIRBORNE EMERGENCY ASSISTANCE. A decision to request or render airborne emergency assistance must be tempered by sound judgment, a thorough evaluation of conditions, and the alternatives available.

a. Benefits vs Risks. Consideration of possible benefits derived versus inherent risks involved in an inflight inspection must include:

(1) Aircrew experience and proficiency in flying close formation.

(2) Dissimilar aircraft in close formation.

(3) Adverse weather turbulence, and darkness during formation flight.

(4) Knowledge of performance capabilities and limitations of other types of aircraft. For example, airspeed, configuration, maneuverability, and cockpit visibility restrictions.

(5) Maneuvers/procedures to be performed. For example, type formation, lead designation, visual indications expected, and anticipated action of the distressed aircraft (these items must be briefed and understood by the involved aircraft commanders prior to join-up).

b. Chase Aircraft. Normally, only instructor pilots assigned to the Base Operations and Training Division, 301 TFW/465 TFS (AFRes), and Flight Test Branch (Oklahoma City ALC/MABF) will be authorized to perform duties as chase pilot. However, if the emergency dictates an immediate requirement for a chase aircraft, any qualified pilot may be used to assist the aircraft in distress. The following restrictions apply to all assigned/attached pilots when performing as chase pilots:

(1) OT or Flight Test Instructor Pilots. Operations will be conducted at no less than 50 feet separation from the aircraft in distress.

(2) Other Pilots. Operations will be conducted at no less than 200 feet separation from the aircraft in distress.

(3) All Pilots. Because of adverse aerodynamic effects, the chase aircraft will not be flown in close vertical proximity to any portion of B–52, C/KC–135 or other large aircraft.

30. EXTERNAL STORES JETTISON AREA. Following procedures will be used when it becomes necessary to drop external stores when fuel and flight conditions do not dictate an emergency situation (see attachment 3, view B).

a. During Day VFR Weather:

(1) Contact Tinker Tower to advise of the requirement to jettison external stores and receive an Oklahoma City RAPCON fequency.

(2) Advise Oklahoma City RAPCON of requirement to jettison external stores and proeceed to the jettison area. Achieve positive radar identification enroute to the jettison area.

(3) Establish aircraft flight manual airspeed and altitude prior to entering the jettison area.

(4) Establish, if possible, a southerly heading aligned with the North Canadian River at a point approximately 5 NM northwest of Westheimer Airport, Norman, Oklahoma.

(5) Clear the intended drop area and jettison stores when the north edge of the sandbar passes under the aircraft.

(6) Submit incident report according to AFR 127–4.

b. During Night VFR or During IFR Weather:

(1) Advise Oklahoma City RAPCON of requirement to jettison external stores.

(2) Oklahoma City RAPCON will issue radar vectors and instructions to control the aircraft throughout the jettison mission. The aircraft commander will jettison the stores upon notification the aircraft has entered the drop area.

(3) After stores have been jettisoned, the aircraft will be vectored for an approach to Tinker AFB.

(4) After completion of jettison mission, the aircraft commander will make a report to the Tinker Base Operations Branch. (Reference a(6) above.)

31. CONTROLLED BAILOUT. If an inflight emergency requires an aircrew to abandon aircraft and the aircraft may be maneuvered to the bailout area the following procedures apply:

a. Emergency Transmission. IFF/SIF switch to "Emergency," Mode 3 switch in, Mode 3 dial code 77 (new code 7700).

b. Bailout Procedures. The controlled bailout area is 15 NM on the 135° radial of the Tinker TACAN. If under Oklahoma City RAPCON control or navigating via TIK TACAN, the aircraft will be directed to or proceed to this point.

32. INSPECTION OF LANDING GEAR. When a pilot reports landing gear malfunction and requests a visual check, the following procedures will apply:

a. Tinker Tower. Tower personnel will:

(1) Activate the primary crash net.

(2) Coordinate all touch-and-go landings and the final approach/landing with the base operations representative assisting in recovering the aircraft.

(3) After completion of landing roll, direct the pilot to hold on the runway with engine(s) running and await safety gear pin/clip installation before taxiing/towing to the ramp.

b. Base Operations. The Chief, Base Operations and Training Division or his designated representative will select the best qualified personnel to assist the pilot. Individual(s) will:

(1) Take a position adjacent to the runway in use and, with tower approval, establish radio contact with the pilot. Runway surveillance units (RSU) or radio-equipped vehicles may be used.

(2) Coordinate and direct flyby inspections and touch-and-go landings through Tinker Tower.

(3) When a chase aircraft is required, notify the commander of flying operations. (See paragraph 29b.)

(4) Take runway foaming under advisement after review of the applicable aircraft DASH–1 (reference paragraph 28).

(5) During IFR conditions:

(a) Request chase pilot/aircraft assistance if required.

(b) Under control of RAPCON, establish a VFR rendezvous with the chase aircraft, weather permitting.

33. HOT BRAKES. When an aircraft is discovered with or suspected of having "hot brakes", or if smoke/fire is observed in the aircraft landing gear area, the following procedures will apply:

a. Senior Fire Protection Officer. The senior fire protection officer will dispatch firefighting equipment to the scene in sufficient numbers to contain the "hot brakes" or emergency situation whether fire is evident or not. Water, agent, or cooling apparatus will not be applied unless specifically directed by Base Aircraft Maintenance Division (2854 ABG/MA), Oklahoma City ALC Flight Test Branch maintenance personnel or 301 TFW/465 TFS (AFRes) maintenance representatives. However, if fire is present, the senior fire officer will make every effort to extinguish the blaze.

b. Tinker Tower. When the air traffic controller observes a rejected take-off; smoke/fire in the aircraft

landing gear area; or, receives notification from a pilot that "hot brakes" are suspected, he will activate the primary crash net. Circumstances permitting, request the pilot taxi to the nearest "HOT BRAKES" area (reference attachment 6, view A) and stand by for fire crash/maintenance inspection. *NOTE: **When Oklahoma City ALC Flight Test Branch or 301 TFW/465 TFS (AFRes) aircraft are involved, identify the aircraft specifically by call sign so that respective unit maintenance personnel will respond.***

c. Base Operations Branch (2854 ABG/OTB). Upon receipt of call over the primary crash net, OTB will activate the secondary crash alarm system and prefix the call with "HOT BRAKES"; or, handle as an aircraft emergency. Reference the above note in paragraph b. Respective maintenance personnel will be advised.

d. Aircrew Members:

(1) Pilots suspecting their aircraft has "HOT BRAKES" will notify the Control Tower and, if possible, clear the runway and stand by for inspection.

(2) Pilots having a "HOT BRAKES" condition on their aircraft will shut down the engines upon direction of maintenance personnel and evacuate the immediate area. After condition has been corrected, aircraft will be towed to the parking area. If a "HOT BRAKES" condition is not present, the aircraft may be taxied back to the parking area. ***WARNING: Brakes reach their highest temperature approximately 15 minutes after maximum braking occurred. Use only air for cooling. Always approach hot brakes in the direction of wheel rotation.***

34. HOT GUNS:

a. Pilots of aircraft with "Hot Guns" will advise Oklahoma City RAPCON, relaying their aircraft type, call sign, estimated time of arrival, and other pertinent information. All aircraft landing with "Hot Guns" are considered as an emergency which will require:

(1) Tinker Tower to activate the primary crash alarm circuit prior to aircraft landing.

(2) Base Operations Branch to relay all known data on the arriving aircraft over the secondary crash alarm circuit to include: personnel on board, location, type armament/load factor, and fuel on board. Additionally, OTB will notify the Tinker Operations Center, Ext 2171, and request EOD assistance.

b. Unless otherwise directed by the Chief, OT, or his designated representative, Tinker Tower will direct the emergency aircraft to the runway 35 runup area (south end) via the most direct route and to enter the area and park on a heading of 200°.

35. HUNG ORDNANCE. Pilots of aircraft with hung ordnance will insure that the following safety of flight measures are observed:

a. Populated Areas. Return route to Tinker AFB will be flown to avoid populated areas. If a missed approach is necessary, fly a closed traffic pattern avoidi[illegible] above areas as much as possible. Landing lights will b[illegible] turned on.

b. Landing Runway 35. Winds/barrier permitting, runway 35 is the primary runway for landing aircraft with hung ordnance. After landing roll, clear the runway, aircraft heading 170°, and await de-arming before taxiing to the ramp.

c. Landing Runway 17. When landing on runway 17, pilots with hung ordnance will proceed to a clear area northeast of the field and fly an angling final to one-half mile, avoiding populated areas as much as possible. After landing roll, park aircraft on the runway 35 runup area, heading 200°, and await de-arming before taxiing to the ramp.

d. Reports. Should the ordnance release while enroute, the pilot will immediately upon landing, notify the Chief, Base Operations Branch who will submit JOPREP–JIFFY OPREP–3 reports according to JCS Pub 6, Vol V.

36. HOT TAIL HOOK. The following procedures apply when aircraft land with an extended tail hook:

a. Landing Roll. During the landing roll pilots will notify Tinker Tower and taxi to the nearest HOT TAIL HOOK area (reference attachment 6, view A).

b. Tinker Tower. The air traffic controller will alert fire/crash rescue and direct the aircraft to remain in the HOT TAIL HOOK area with engine(s) running.

c. All Pilots. Under normal operations, pilots will not attempt to taxi their aircraft until the hook has been cooled and re-cocked.

37. AIRCRAFT BOMB THREATS. When information is received of a possible bomb threat to aircraft either enroute to or parked on Tinker AFB, the following procedures apply:

a. Military/Civil Aircraft Enroute to Tinker AFB:

(1) Tinker Tower. The air traffic controller will activate the primary crash net. Surface winds permitting, the aircraft will be directed to land on runway 17, turn off on the south end runup area, shut down engines, and evacuate passengers and crew to a safe distance -- no less than 2,000 feet from the aircraft. During the landing/evacuation phase, all instructions passed by the Tinker AFB on-scene commander will be relayed to the aircraft commander.

(2) 2854 ABG/OTB. The OTB shift supervisor will activate the secondary crash net. JOPREP JIFFY OPREP–3 reports will be submitted according to JCS Pub 6, Vol V.

(3) 2854 ABG/SP. The Chief, SP, or his designated representative, will direct the search of military aircraft, and, if necessary, request EOD assistance. Civil authorities and/or the Federal Bureau of Investigation may be requested to conduct the search of civil aircraft.

(4) 2854 ABG/MA. The Chief, MA, will furnish a senior supervisor who will act as technical advisor to point out possible locations on the aircraft for a hidden bomb.

b. Parked Aircraft. Should information be received that a bomb has been placed on a parked aircraft, the following procedures apply:

(1) 2854 ABG/OTB. The shift supervisor will, upon receipt of the above information, activate the secondary crash net and submit required reports (see a(2) above).

(2) 2854 ABG/SP. The Chief, SP, or his designated representative, will evacuate all personnel from nearby areas to a safe distance; direct the search; and if required, request EOD assistance.

(3) 2854 ABG/MA. When possible, and after coordinating with OTB, aircraft will be towed to an isolated area on the airfield. Technical advice will be furnished (see a(4) above).

c. On-Scene Commander. The Chief, Base Operations and Training Division, or his designated representative, will function as the on-scene commander for all bomb threats to aircraft arriving Tinker AFB or parked on the airfield apron.

38. AIRCRAFT THEFT/HIJACKING. In order to prevent or thwart any attempt to seize an aircraft either from the ground or in the air, assigned/attached pilots will be familiar with the Radar Beacon Procedures as outlined in the appropriate Flight Information Publication and published in TAFB OPLAN 60–14.

39. SCANTANA. Assigned/attached pilots will be familiar with the contents of TAFB OPLAN 60, "SCANTANA -- Security Control of Air Navigational Aids," and AFR 60–24. Execution of subject plan will normally be subsequent to declaration of defense emergency/air defense emergency.

CHAPTER 7

AIRCREW PROCEDURES

40. SHOW TIME. Aircrews will observe the following minimum "show time" at operations when scheduled for flights in base assigned aircraft:

a. Training Flights – 1½ hours prior to take-off.

b. Passenger Airlift Flights – 1½ hours prior to take-off.

c. Standardization/Evaluation Flights – 2 hours prior to take-off.

d. Functional Check Flights (FCF) – 1½ hours prior to take-off.

NOTE: Aircrews performing FCF's will report to Base Aircraft Maintenance Division for FCF briefing prior to flight and for debriefing after flight.

41. AIRLIFT MISSION REPORTING. The aircraft commander of base assigned aircraft is responsible for notifying Tinker AFB of the progress of his flight and the maintenance status of his aircraft under the following conditions:

a. Landing at a Military Airfield. During duty hours call Tinker AFB AUTOVON 735, Ext 3496/2815. After duty hours and on weekends and holidays, call Ext 2191/5328. The aircraft commander will request the air traffic control specialist to pass the following information to the Chief, OT, supervisor of flying (SOF), or the Deputy Base Commander:

(1) Actual time of arrival (ATA) and aircraft status.

(2) Estimated time of departure (ETD) and destination.

(3) Enroute and destination weather. If required, alternate airfield selected.

(4) Estimated time enroute (ETE).

(5) Deviations encountered and, if required, assistance requested.

***NOTE:** Deviations from published flight orders for other than emergencies and safety of flight items require approval of the Chief, OT.*

b. Landing at a Civil Airfield. When a deviation is encountered resulting in a delay or change in the published flight order, the aircraft commander will call Tinker AFB collect, extensions as listed above, and pass along information outlined in paragraphs a(1) and a(5) above.

c. Remain Overnight (RON). Prior to the first flight of the day from a military or civil airfield, information listed in paragraph a above will be passed to Tinker AFB.

d. Flight Schedule Change. Any change of a previously approved flight schedule involving a RON, change of destination, or cancellation will be approved by the Oklahoma City ALC Commander or Base Commander.

42. CLOSING FLIGHT PLAN. The aircraft commander is responsible for insuring his flight plan has been closed.

43. AIRCRAFT DEPARTURE/ARRIVAL POINTS. The 2854 ABG T–39 aircraft will depart from and arrive at Bldg 240 (Base Operations). All other base assigned aircraft will, for all passenger airlift flights, depart from and arrive at Bldg 244 (Passenger Terminal), regardless of grade or number of passengers.

44. AIRCREW SURVIVAL AND PROTECTIVE EQUIPMENT AND CLOTHING:

a. Aircrew Member's/Passenger's Life Support Clothing. The commander, flying operations, is responsible for determining the type uniform to be worn by all assigned/attached aircrew members. The aircraft commander will insure that homogeneous clothing is worn by all aircrew members and, when necessary, recommend appropriate clothing for passengers.

(1) Aircrew Members:

(a) Passenger Airlift Missions – Authorized combination for the appropriate season.

(b) Local and Functional Check Flights – Flame retardant flight suits, black leather flight boots, shoulder rank (plastic), black leather or plastic name tag/aeronautical rating (silver lettering/insignia on black background).

(c) Authorized clothing for inflight passenger specialists, in addition to that listed for other aircrew members is: Civilian sport jackets and shirts in contrasting colors with dark blue, grey, or black trousers; black dress shoes and dark blue all-weather coat. ***NOTE:** When the weather is uncomfortably warm, inflight duties may be performed without the jacket.*

(d) Flight engineers may wear flight suits or fatigues while in the actual performance of preflight, postflight, and maintenance duties.

(2) Military Passengers – Authorized uniform as appropriate.

b. Life Support Equipment. The chief of the aircrew survival and protective equipment (ASPE) function of OTF will provide survival equipment and containers with following minimum essential items for each base assigned aircraft:

	T–29	T–39
Pyrotechni Signaling Device	5 ea	2 ea
Portable Radio	1 ea	1 ea

	T–29	T–39
First Aid Kit	5 ea	2 ea
Signal Whistle	5 ea	2 ea
Signal Mirror	5 ea	2 ea
Safety Matches in Water-proof Containers	5 ea	2 ea
Water Storage Bag	5 ea	2 ea
Knife	5 ea	2 ea
Compass	1 ea	1 ea

c. Installation of Survival Kits. Survival equipment is packed in metal canisters (wt 31 lb) and installed in base assigned aircraft as follows: T–29 – one; T–39 one. Because of space limitations, the T–39 canister is compact and located under the rear passenger seat. Each kit will be inspected by a member of the aircrew for secure attachment/ broken seals during each preflight inspection.

d. Smoke, Oxygen Masks, and Parachutes. The chief, ASPE, is responsible for inspection, maintenance and/or cleaning of smoke, oxygen masks and parachutes carried on Oklahoma City ALC flight test and base assigned aircraft. Items are inspected and/ or cleaned every 30 days unless requested earlier. Masks are inspected by aircrew members during each preflight inspection. Parachutes are repacked every 120 days.

45. FUNCTIONAL CHECK FLIGHTS. Aircrews performing functional check flights will note the flight check profile number or depict the proposed route in the remarks section of the DD Form 175, "Military Flight Plan." (References B–52, KC-135 and fighter aircraft, attachments 8 thru 13; T–29, attachment 14; T–39, attachment 15.)

CHAPTER 8

BASE OPERATIONS

46. FLIGHT PLANNING:

a. Supervisor of Flying (SOF). Flight plans involving 2854 ABG aircraft will be approved by the SOF prior to submission to Base Operations Branch (OTB) for processing. Additionally, the SOF will maintain a weather watch throughout all phases of the mission profile when enroute or destination weather is questionable and may impair safety of flight. Detailed duties of the SOF are directed in AFLCM 60–2/Oklahoma City ALC–TAFB Supplement 1.

b. Flight Crew Information File (FCIF). Prior to filing a flight plan, aircrews assigned to 2854 ABG will review the appropriate temporary pilot and flight crew information file and signify they have read and understand FCIF contained materials. The FCIF certification will be accomplished by noting the latest entry number, date, and aircrew initials on the FCIF card.

47. AIRFIELD LIGHTING:

a. Runway lighting:

(1) Hight Intensity Runway Lights (HIRL). When there is no reported aircraft traffic and the prevailing visibility is one mile or less, HIRL will be operated as follows:

(a) Visibility at or above landing minimums:

Sunrise to sunset – Step 2

Sunset to sunrise – Step 3

(b) Runway Visual Range (RVR) is reported below landing minimums:

Sunrise to sunset – Step 3

Sunset to sunrise – Step 4

(2) HIRL will be operated at Step 1 during periods of night flying by locally assigned/attached aircraft, when there is no reported aircraft traffic or the above landing minimums do not apply.

(3) HIRL Intensity Setting Table is as follows:

STEP	VISIBILITY DAY	VISIBILITY NIGHT
5	Less than 1 mile (see note 1)	On request
4	1–2 miles or below. Minimum at Step 3 – no traffic	Less than 1 mile (see note 1)
3	On request or below minimum at Step 2 – no traffic	1–3 miles or less than 1 mile – no traffic
2	On request or less than 1 mile – no traffic	3–5 miles
1	On request	More than 5 miles (see note 2)

NOTE 1: And/or appropriate Runway Visual Range/ Runway Visual Visibility (RVR/RVV) equivalent.

NOTE 2: And/or during "local" night flying conducted by Tinker AFB assigned/attached aircraft (VFR/IFR ROUND ROBIN FLIGHT PLAN).

(4) Medium Intensity Runway Lights (MIRL). When runway 12/30 is required for aircraft operations, the MIRL Intensity Setting Table is as follows:

STEP	VISIBILITY DAY	VISIBILITY NIGHT
3	Less than 2 miles	Less than 1 mile
2	2–3 miles	1–3 miles
1	When requested	More than 3 miles (see note)

NOTE: The requirements listed in paragraph a(2) above apply.

(5) Runway 17/35 HIRL will be turned on and set at the appropriate setting specified for existing weather conditions (visibility) in the event the control tower is evacuated. All taxiway lights serving the airdrome will be left on during this period.

b. Approach Lighting. Between 2400 hours (local) and sunrise, approach lighting to runway 35 will be maintained as follows:

(1) VFR Weather Conditions. When runway 35 is in use, approach lights will be maintained in the "off" position and turned on during all aircraft arrivals.

(2) IFR Weather Conditions. When runway 35 is in use, approach lights will be maintained at the lowest possible intensity setting. Intensity will be increased, based on visibility observations issued by base weather, during all aircraft arrivals.

(3) Circling Approaches Under IFR Conditions. When runways 12 or 30 are in use, procedures for operation of approach lights listed in paragraph b(2) above apply.

48. DESIGNATION OF RUNWAY IN USE:

a. Runway Selection. Normally, Tinker Tower will determine the runway in use. When conflicting information is received from the wind sensors or an operational requirement exists that may deviate from normal operating procedures, the Chief of Airfield Management or his designated representative, will determine the runway in use.

b. Wind Sensors. Surface wind information will be reported using wind sensors located at each end of runway 17/35. When runway 12 is in use the runway 17 sensor will be selected; when runway 30 is in use the runway 35 sensor will be selected. Surface winds for runway 12/30 are reported as estimated.

c. Notification:

(1) Tinker Tower. When a runway change is imminent, prior notification to Base Operations Branch, Oklahoma City Approach Control, Precision Radar, and, if required, the runway supervisory officer will be accomplished (see paragraph 3a).

(2) Base Operations Branch. When 465 TFS flying training missions are in progress, Base Operations Branch will coordinate runway change with the supervisor of flying, Ext 3268/7641.

d. Calm Wind Runway. Runway 17 is designated the calm wind runway and may be used whenever surface wind velocity is less than 10 knots, regardless of direction. When wind velocity exceeds the tail wind component for individual aircraft, Tinker Tower may authorize opposite direction landings.

49. INTERSECTION DEPARTURES. Intersection departures from runways 17/35 or 12/30 may be approved upon pilot request. Runway distance remaining from connecting taxiways and the intersection of runway 12/30 is shown in the following table:

TAXIWAY	RUNWAY 35 DISTANCE REMAINING	RUNWAY 17 DISTANCE REMAINING
XIII	8,000'	3,100'
X	6,200'	4,900'
III	4,200'	6,900'
XII	2,200'	8,900'
V	600'	10,500'

INTERSECTION	RUNWAY 12 DISTANCE REMAINING	RUNWAY 30 DISTANCE REMAINING
Taxiways II & III	3,700'	4,100'

50. REDUCED RUNWAY SEPARATION. Reference Terminal Air Traffic Control Handbook 7110.8. Aircraft operating from Tinker AFB are subject to supplementary separation standards as follows:

a. Arrivals. Reference subject handbook:

(1) When a category III aircraft is landing behind a category I or II aircraft, the preceding aircraft will be clear of the runway before the arriving aircraft crosses the landing threshold.

(2) When a category III aircraft is landing behind another category III aircraft the preceding aircraft will have traversed 6,000 feet down the runway before the arriving aircraft crosses the landing threshold.

b. Departures. Reference subject handbook. Departures are as published. ***NOTE:** Aircraft practicing touch-and-go landings or low approaches are subject to the above separation standards.*

51. RESTRICTING AIR TRAFFIC DURING A DISASTER (ACTUAL OR PRACTICE):

a. The Chief, OT, or his designated representative, and the Control Tower supervisor are authorized to temporarily restrict aircraft operations at Tinker AFB during an emergency situation. This authority will not be further redelegated.

b. When the situation dictates, the above designated individuals may halt all taxiing aircraft; clear the traffic pattern of all aircraft except emergencies; and take additional control action deemed necessary during the disaster.

c. After an emergency landing, the runway will be closed until either inspected and/or released by the Chief, OT, or his designated representative.

52. MILITARY AIR EVACUATION/CIVIL AMBULATORY FLIGHTS. Tinker Tower will notify OTB with ETA, of all arriving military air evacuation and civil ambulatory flights as soon as possible after initial contact, or at 10 miles on final and relay information requested by pilot.

53. US CUSTOMS AND AGRICULTURE SERVICE. All aircraft arriving from foreign stations will be met for customs/agriculture inspections by US Customs/ Department of Agriculture inspectors or their designated representatives.

54. AF FORM 15, "USAF INVOICE," PURCHASES. Because of the high cost of aviation fuels, Tinker AFB assigned/attached pilots are reminded that the purchase of aviation fuels from commercial sources will be limited to emergency purchases only. During the flight scheduling phase, the officer in charge will ascertain that civil airfields selected throughout the mission profile are listed in the IFR-Supplement (Enroute) as having contract fuel. Provided no contract fuel is available and the flight cannot be diverted to a nearby military airfield, the request to purchase fuel, with AF Form 15, will be approved by the Chief, OT, or his designated representative, prior to departure.

55. BALLOON OPERATIONS. The 6th Weather Squadron (Mobile) has a requirement to release

Rawinsonde observation balloons and to conduct Wiresonde training using moored, kytoon (barrage type), kite balloons on Tinker AFB. In all instances, aircraft operations will have priority over balloon operations.

a. Rawinsonde Observation Balloons. Rawinsonde observation balloon releases are unscheduled. Policies and responsibilities for the release of balloons are as follows:

(1) 6th Weather Squadron (Mobile) will:

(a) Contact Tinker Tower for clearance prior to balloon release.

(b) Obtain new clearance if balloon is not released within five minutes after specified time.

(2) Tinker Tower will:

(a) Issue approval for balloon release only after careful consideration of safety of flight and air traffic operations.

(b) Issue advisories to aircraft under tower control while the balloon is in the airport traffic area.

(c) If for any reason it becomes necessary to cancel the approval, contact 6th Weather Squadron (Mobile), Ext 7764/2328.

b. Wiresonde Operations. Wiresonde training is conducted on Tinker AFB using a kytoon (barrage) type kite balloon. Kytoon balloon may be flown at a height of 1,500 feet; however, normal training height is between 300 to 500 feet AGL. Balloon dimensions are 10 feet long x 4 feet diameter and 35 feet long x 14 feet diameter. Mooring location is in the southwest portion of Tinker AFB; 3,600 feet south/southwest of runway 12/30 and 4,800 feet west of runway 17/35. Policies, responsibilities, and restrictions for flying the kytoon balloon are as follows:

(1) 6th Weather Squadron (Mobile) will:

(a) Obtain approval from the base operations officer or the senior air traffic control specialist, Ext 2191.

(b) Specify the hours of operation and height above ground balloon will be flown throughout entire training period.

(c) Fly kytoon balloon only during daylight hours when visibility is seven miles or greater with no clouds below 6,000 feet.

(d) Notify Base Operations Branch immediately upon termination of training flight.

(2) Base Operations Branch will:

(a) Ascertain that weather conditions meet above requirements during training period requested.

(b) Approve training flight only after careful consideration of safety of flight and air traffic operations.

(c) Advise Tinker Tower of approved training flight and furnish information listed in paragraph b(1)(b) above.

(d) When runway is changed to 12/30 or when helicopters are using the helipad for practice landings (see attachment 7) and kytoon balloon is being flown, contact 6th Weather Squadron (Mobile), Ext 7764/2370, and request balloon be lowered to 200 feet AGL.

(e) If for any reason it becomes necessary to cancel a kytoon balloon training flight, 6th Weather Squadron (Mobile) will be contacted at above extension.

(3) Tinker Tower will issue traffic advisories to each aircraft landing and departing Tinker AFB when kytoon balloon is flown at an altitude greater than 500 feet AGL.

(4) Following restrictions apply:

(a) Runway 17/35. When active runway is 17/35, kytoon balloon will not be flown at an altitude in excess of 500 feet AGL. ***EXCEPTION:* *With Base Operations Branch approval, balloon may be raised to 1,500 feet for equipment testing. Immediately upon reaching desired height, balloon will be returned to normal training altitude (300 – 500 feet AGL) for remainder of training period.***

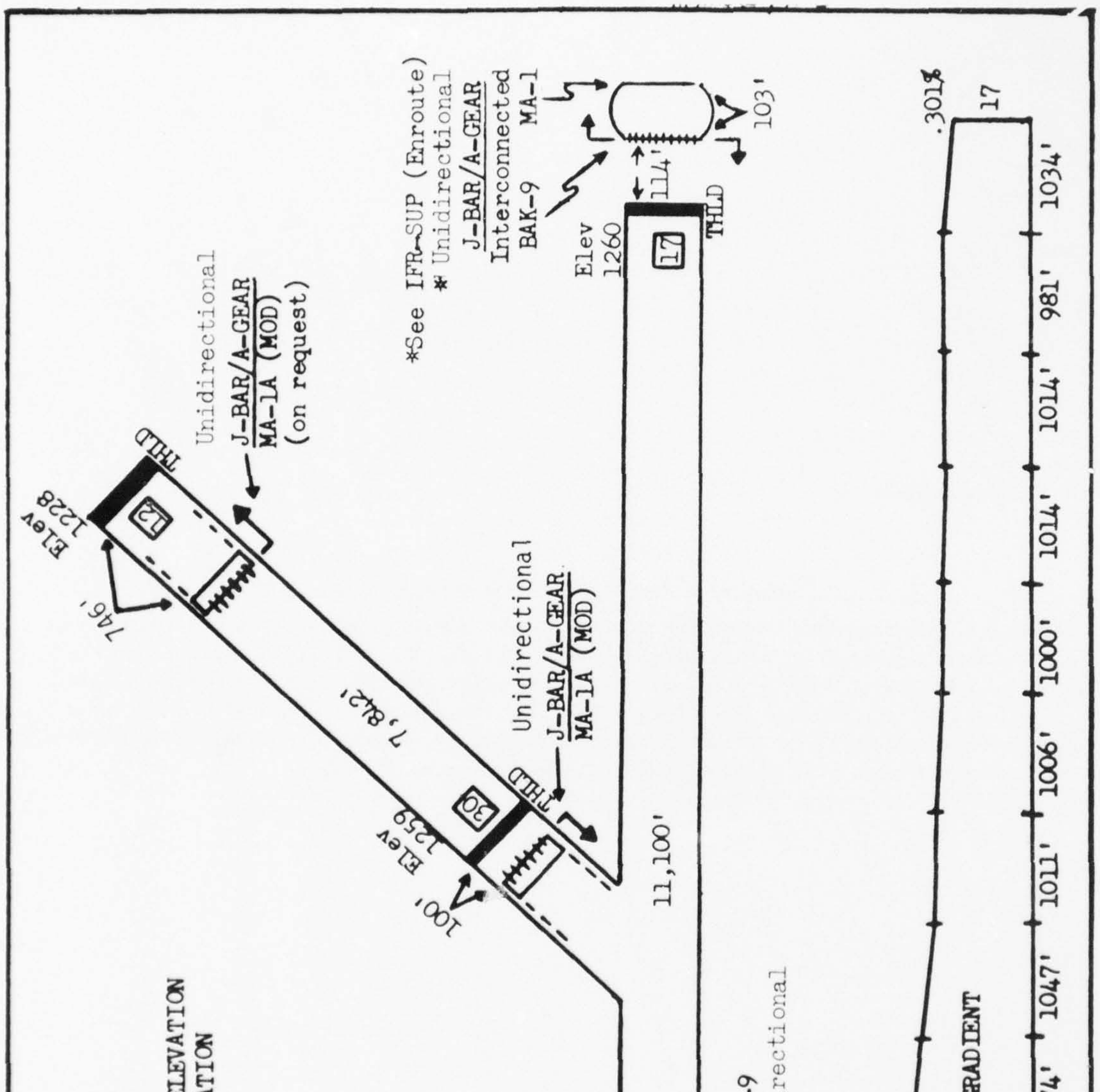
JAMES G. RANDOLPH
Major General, USAF
Commander

JAMES M. HALL, Jr
Colonel, USAF
Commander

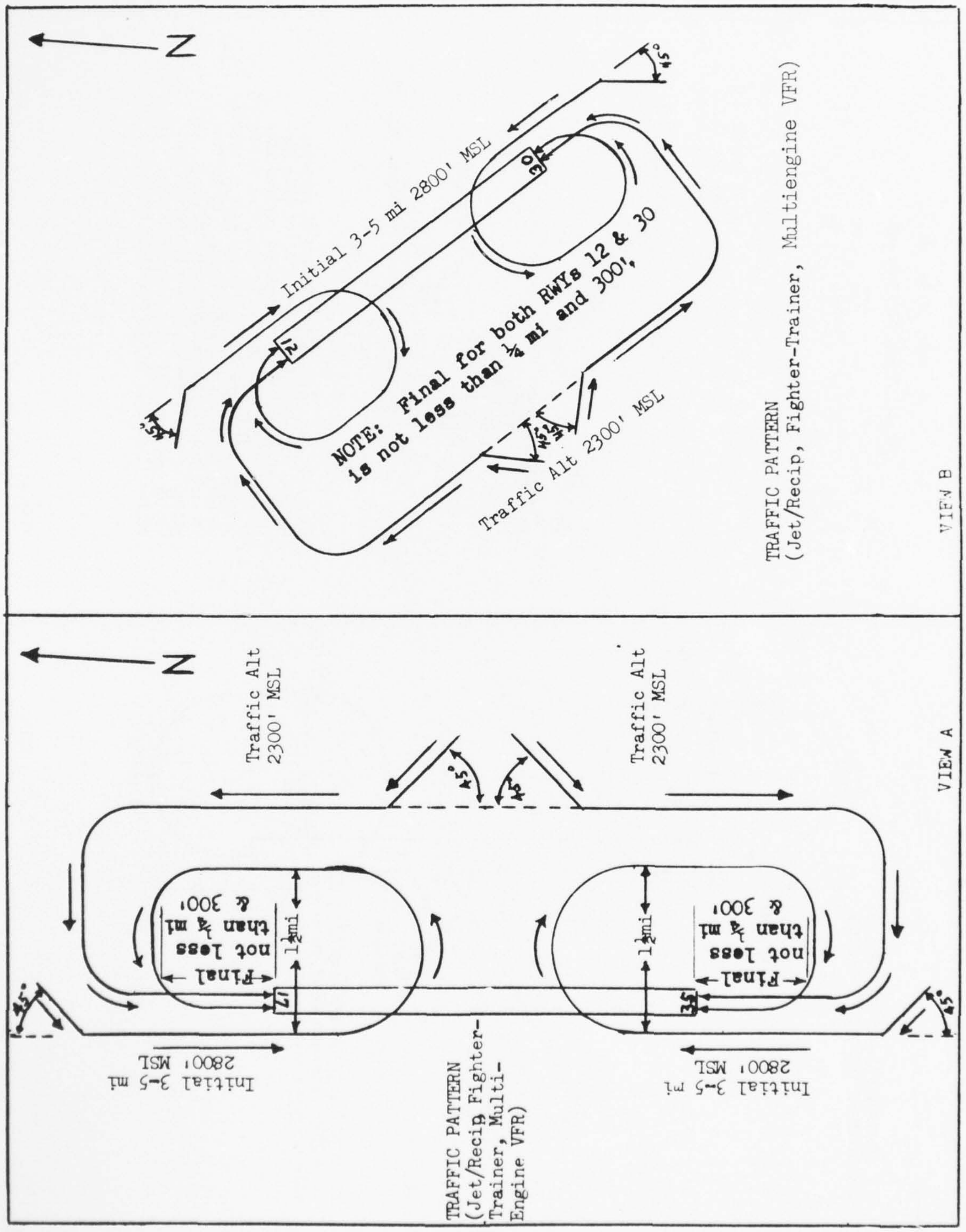
CLEO SANDS
Chief of Administration

Summary of Revised, Deleted, or Added Material

This revision adds procedural information on runway/barrier change procedures (para 3); traffic patterns (para 10); successive/missed approaches (para 17); adds minimum show time (para 40); and functional check flights (para 45); revises IFR departure restrictions (para 19); taxi procedures (para 20); general emergency information (para 26); barrier engagements (para 27); hot brakes procedures (para 33); possible aircraft bomb threat actions (para 37); airfield lighting standards (para 47); designations of runway (para 48); adds new mission profile for B–52 (attachment 8); and generally updates entire text.

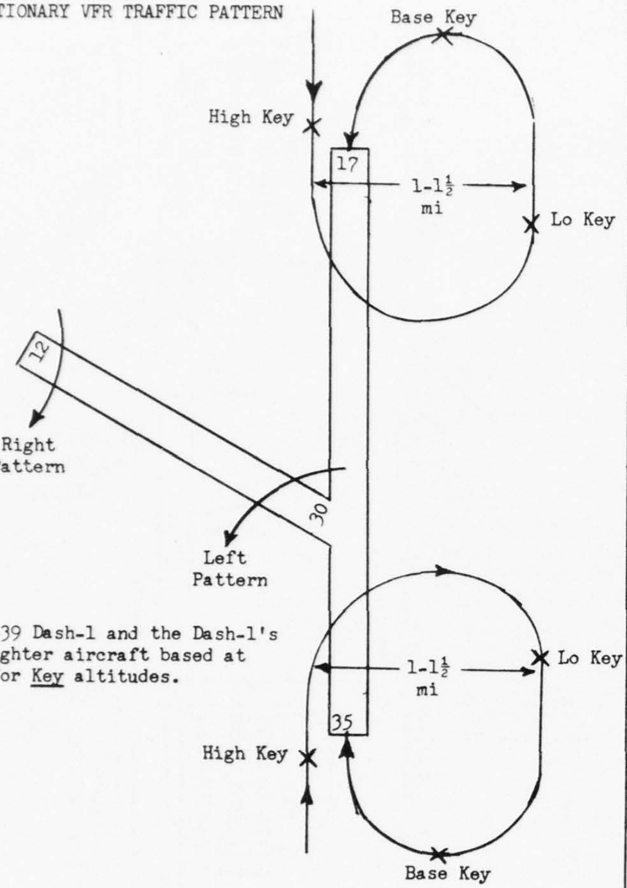


Attachment 1



Attachment 2

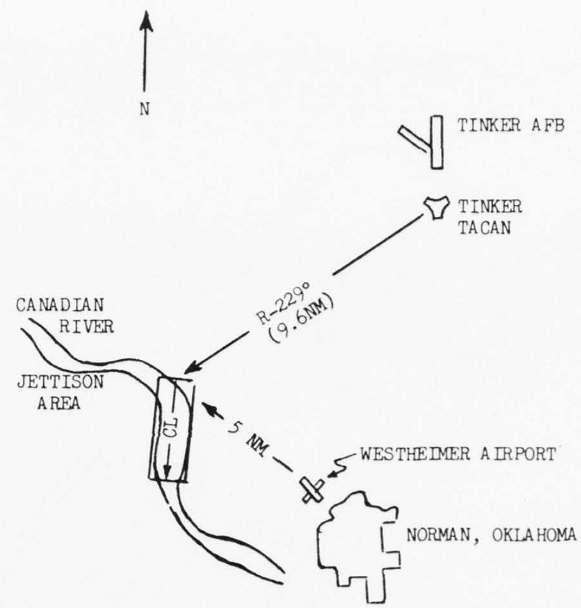
SIMULATED FLAMEOUT AND
PRECAUTIONARY VFR TRAFFIC PATTERN



See T-39 Dash-1 and the Dash-1's for Fighter aircraft based at TAFB for <u>Key</u> altitudes.

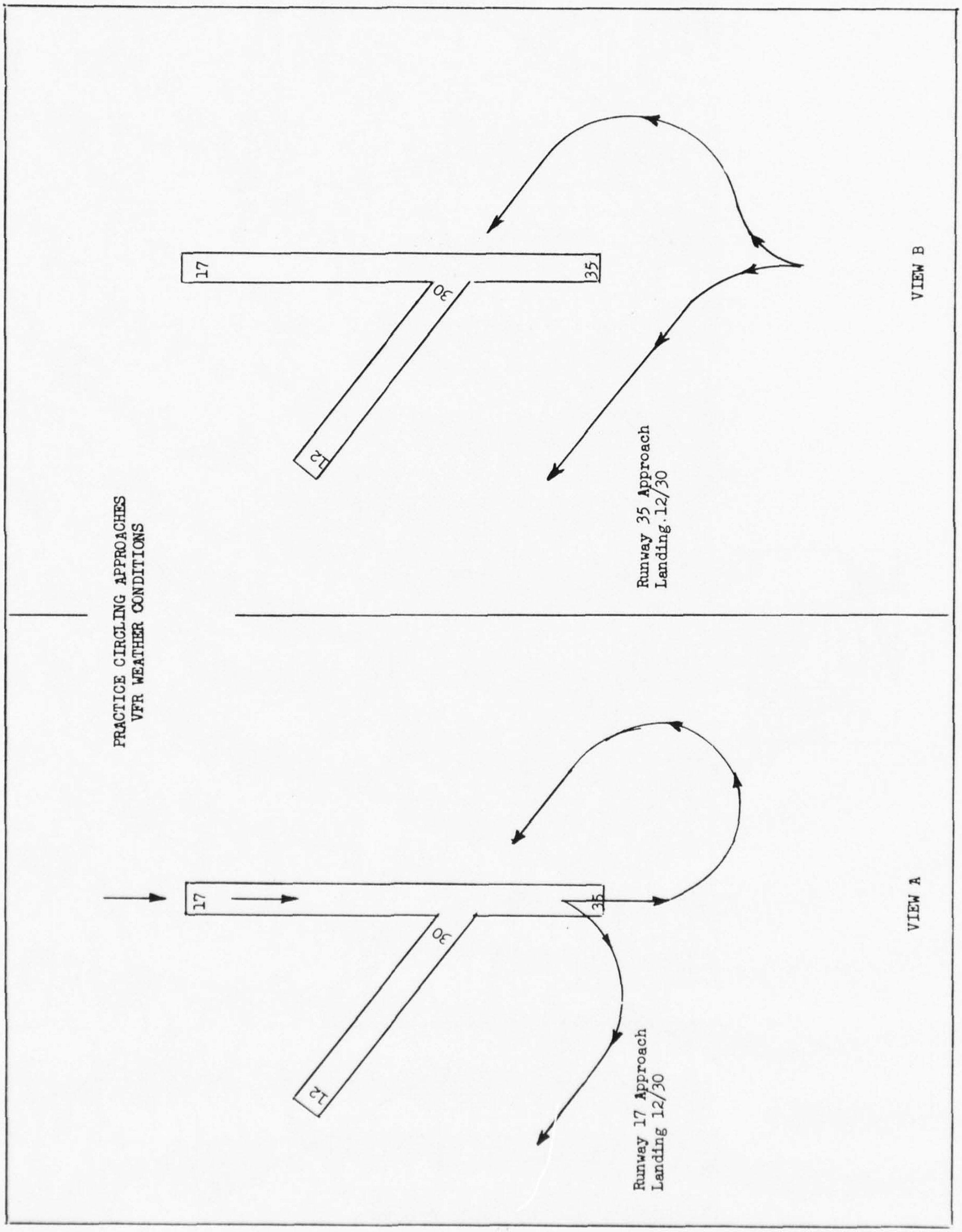
VIEW A

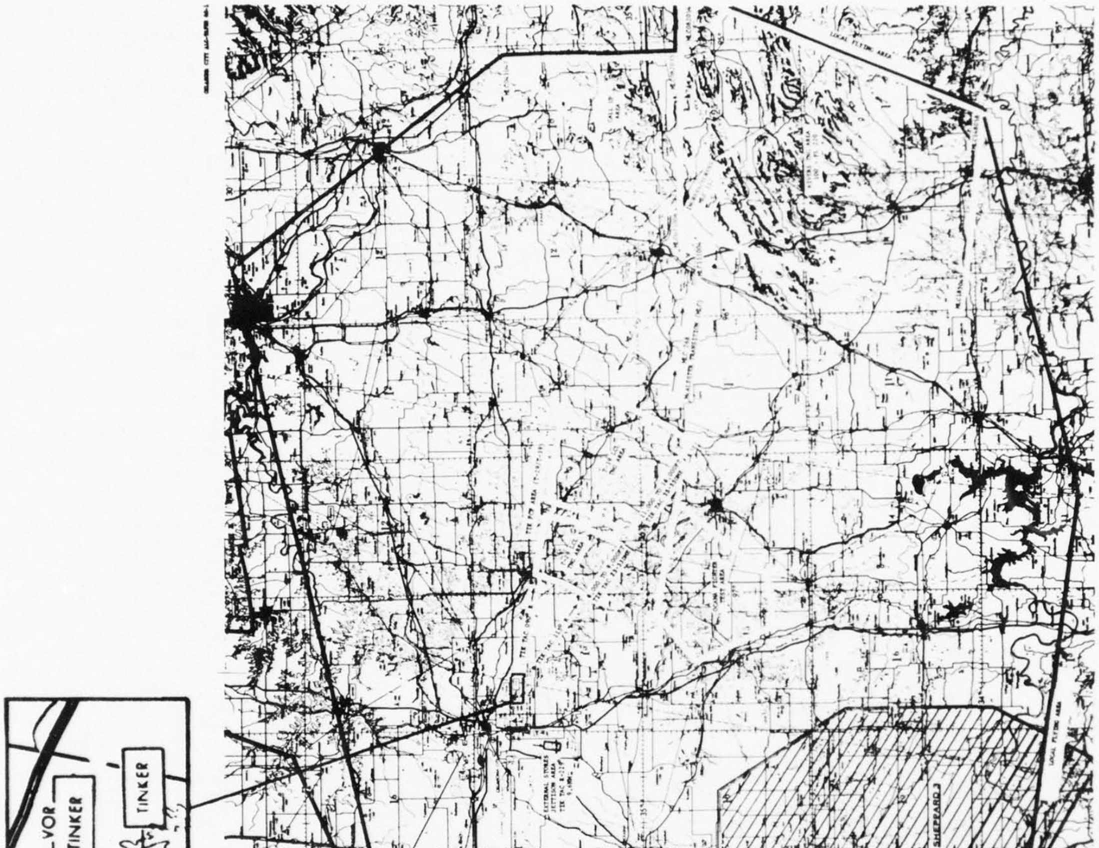
EXTERNAL STORES JETTISON AREA

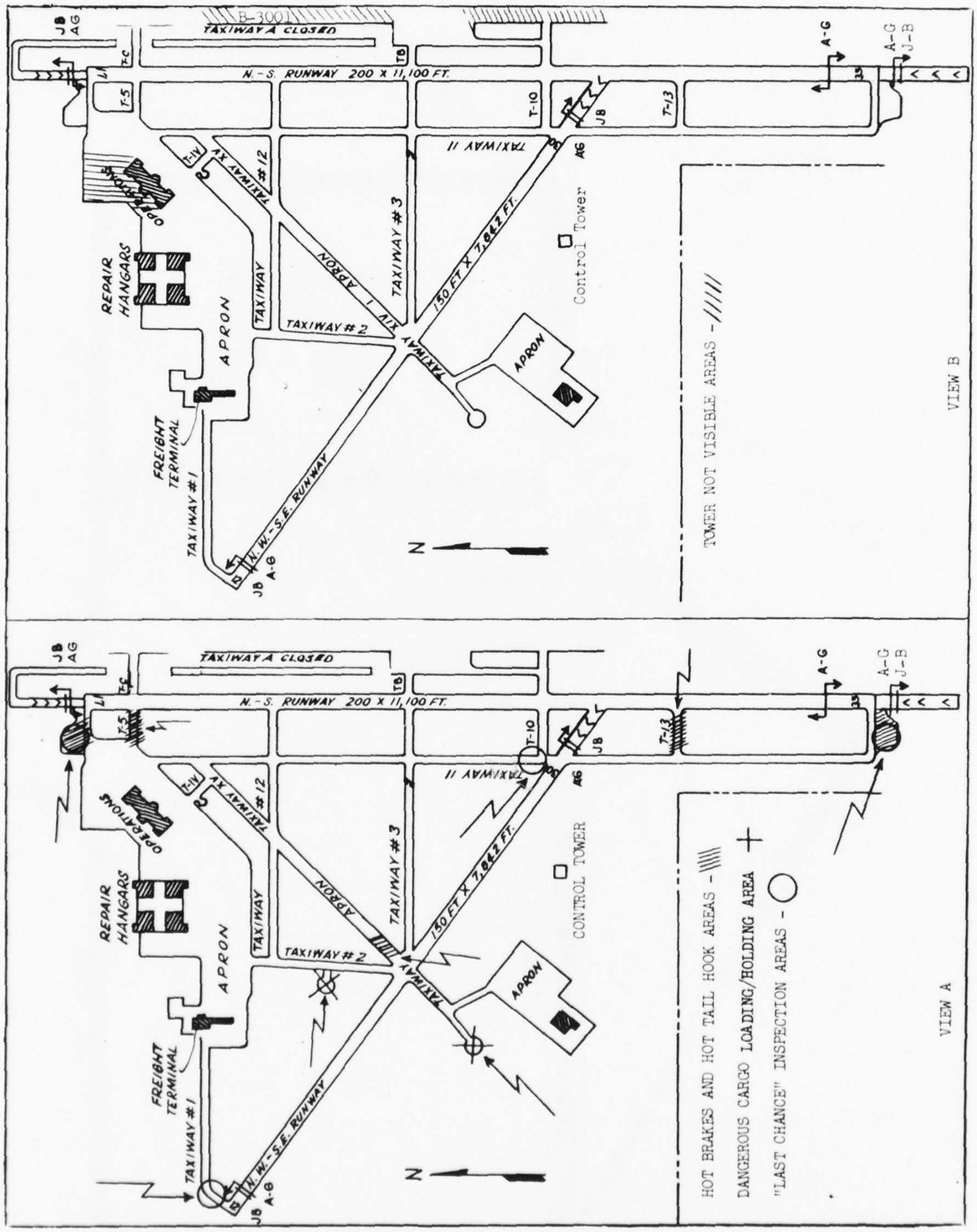


When possible, emergency jettison of external stores, including tip tanks, will be made in above designated area. Suggested pattern altitude is 2,800 feet MSL or as specified in the aircraft flight manual. Jettison area is approximately 1 NM wide and 2.5 NM long. Centerline, no wind heading is approximately 177° mag. All pilots will contact OKLAHOMA CITY RAPCON for vector headings and jettison instructions. The DROP will be made on the SOUTHERLY heading.

VIEW B

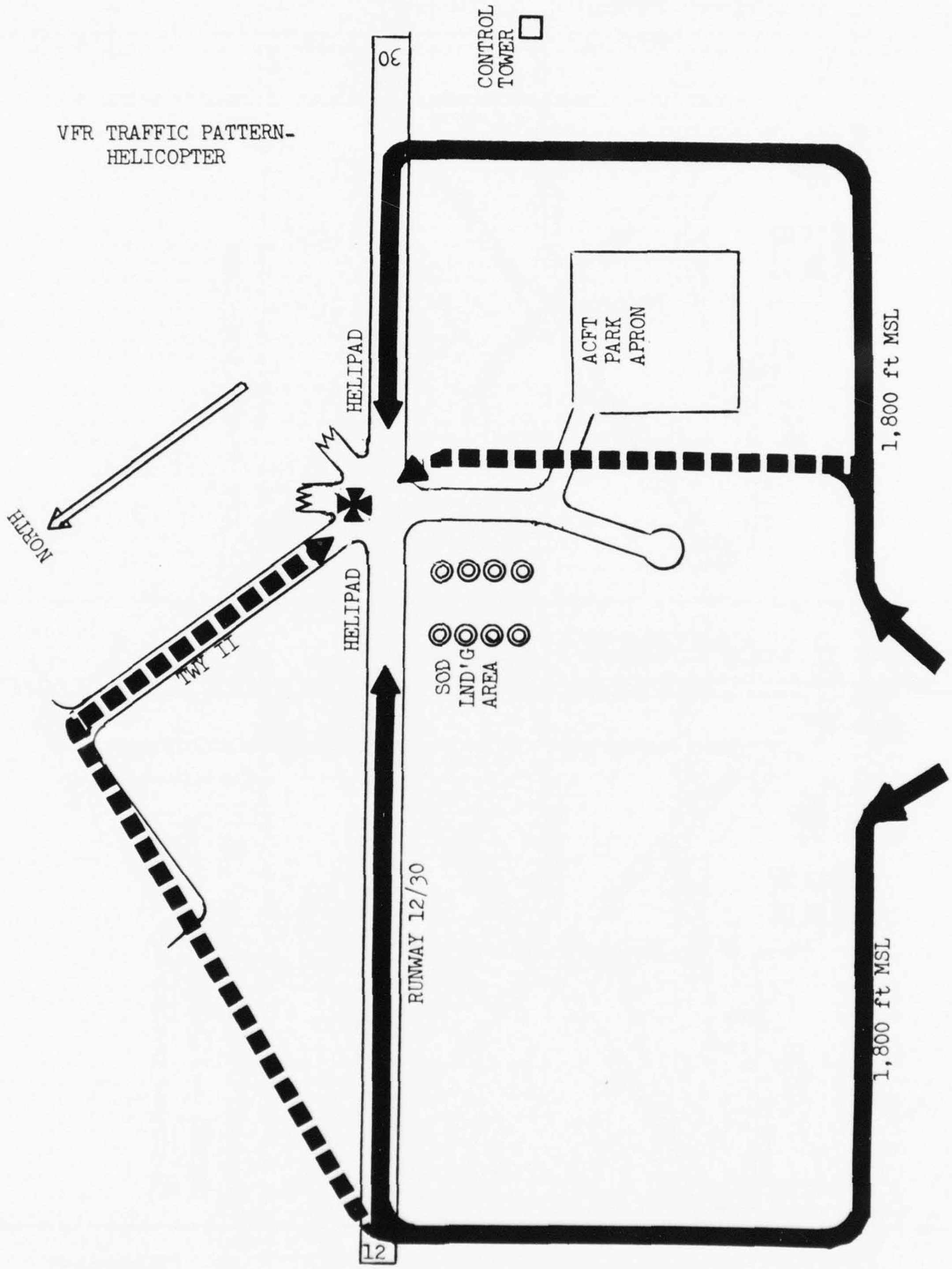

PRACTICE CIRCLING APPROACHES
VFR WEATHER CONDITIONS
17
35
30
12
Runway 17 Approach
Landing 12/30
VIEW A
Runway 35 Approach
Landing 12/30
VIEW B


VOR TINKER
TINKER
VANCE
SHEPPARD
LOCAL FLYING AREA



Attachment 6

VFR TRAFFIC PATTERN-
HELICOPTER



OKLAHOMA CITY ALC FLIGHT TEST - TINKER AFB
MISSION PROFILE RED 1, BLUE 1, GREEN 1, ORANGE 1, YELLOW 1 (B52)

(1) ROUTE: RED 1 - TIK. 8AH2. 8AH..ADM..ABI..ABI 308045/DO+30..ABI..JCT..AUS 278034..AUS 130010..AUS 278034..AUS 305070..AUS 278034.. AUS 201033..AUS 278034..ACT 329014..UBS012079..MSY 006020.. AUS 278034..ADM..8DP..TIK

BLUE 1 - TIK.8AH2.8AH..ADM..ABI..JCT..AUS 278034.. AUS 130010..AUS 278034..AUS 305070..AUS 278034.. AUS 201033..AUS 278034..ACT 329014..UBS 012079.. MSY 006020..AUS 278034..ADM..8DP..TIK

GREEN 1 - TIK. 8AH2.8AH..ADM..ABI..ABI 308045/ DO+30..ABI..MQP..ACT 329014..UBS 012079.. MSY 006020..AUS 278034..ADM..8DP..TIK.

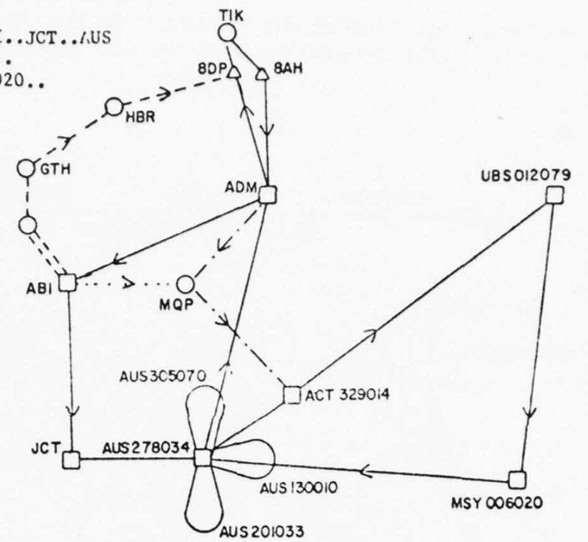
ORANGE 1 - TIK. 8AH2. 8AH..ADM..MQP..ACT 329014.. UBS 012079..MSY 006020..AUS 278034..ADM. 8DP. TIK

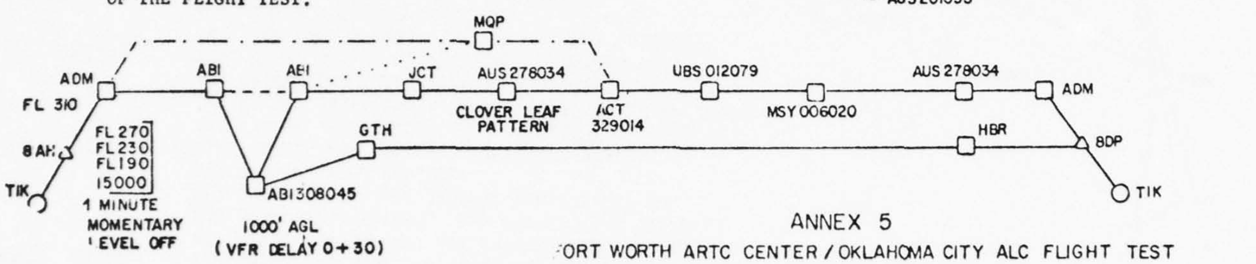
YELLOW 1 - TIK. 8AH2. 8AH. ADM..ABI..ABI308045/ DO+30..GTH..HBR..8DP..TIK

(2) ALTITUDE: AS REQUESTED

(3) TEST: NAVIGATIONAL, FLIGHT CONTROL, SRAM

(4) REMARKS: OFF COURSE VECTORS OR ALTITUDE CHANGES DURING CLOVER LEAF AT AUS 278034 WILL NEGATE THIS PORTION OF THE FLIGHT TEST.





ANNEX 5

FORT WORTH ARTC CENTER / OKLAHOMA CITY ALC FLIGHT TEST BRANCH / DET. 507, 301st TACTICAL FIGHTER WING (AFRes), TINKER AFB LETTER OF AGREEMENT

SUBJECT: OKLAHOMA CITY ALC FLIGHT TEST BRANCH AND DET. 507, 301st TACTICAL FIGHTER WING FUNCTIONAL FLIGHT CHECK AND PROFILES

EFFECTIVE: JANUARY 2, 1975

OKLAHOMA CITY ALC FLIGHT TEST - TINKER AFB
MISSION PROFILE MAPLE 1, BIRCH 1, CEDAR 1, PINE 1 (B52).

(1) ROUTE: <u>MAPLE 1</u> - TIK. 8AH2.8AH..ADM..ABI..ABI 308045/DQ+30.. ABI..JCT..AUS 278034..AUS 130010..AUS 278034.. AUS 305070..AUS 278034..AUS 201033..AUS 278034.. MQP..SPS 238032..LAA 240042..BUM 261060..ADM.. AUS 278034..ADM..8DP..TIK

<u>BIRCH 1</u> - TIK. 8AH2. 8AH..ADM..ABI..JCT..AUS 278034.. AUS 130010..AUS 278034..AUS 305070..AUS 278034.. AUS 201033..AUS 278034..MQP..SPS 238032..LAA 240042.. BUM 261060..ADM..AUS 278034..ADM..8DP..TIK

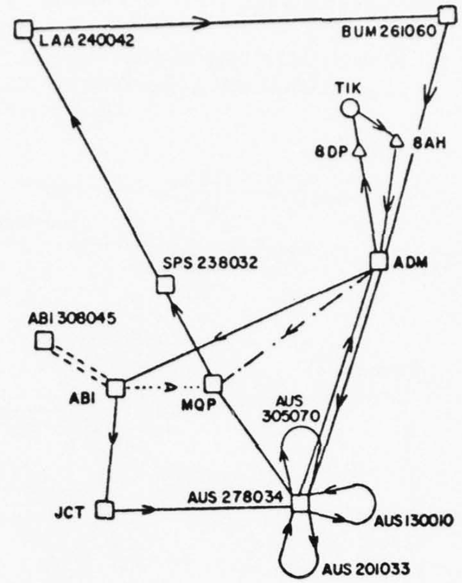
<u>CEDAR 1</u> - TIK. 8AH2. 8AH..ADM..ABI..ABI 308045/DO+30.. ABI..MQP..SPS 238032..LAA 240042..BUM 261060.. ADM..AUS 278034..ADM..8DP..TIK

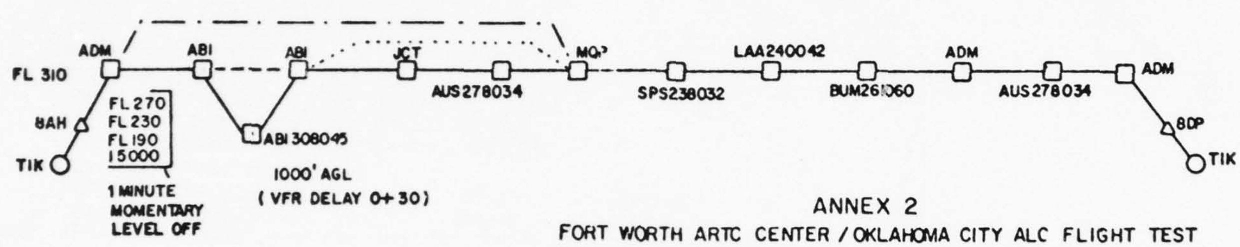
<u>PINE 1</u> - TIK. 8AH2. 8AH..ADM..MQP..SPS 238032.. LAA 240042..BUM 261060..ADM..AUS 278034.. ADM..8DP..TIK

(2) ALTITUDE: AS REQUESTED

(3) TEST: NAVIGATIONAL, FLIGHT CONTROL, SRAM

(4) REMARKS: OFF COURSE VECTORS OR ALTITUDE CHANGES DURING CLOVER LEAF AT AUS 278034 WILL NEGATE THIS PORTION OF THE FLIGHT TEST.





ANNEX 2

FORT WORTH ARTC CENTER / OKLAHOMA CITY ALC FLIGHT TEST BRANCH / DET. 507, 301st TACTICAL FIGHTER WING(AFRes), TINKER AFB LETTER OF AGREEMENT

SUBJECT : OKLAHOMA CITY ALC FLIGHT TEST BRANCH AND DET. 507, 301st TACTICAL FIGHTER WING FUNCTIONAL FLIGHT CHECK AND PROFILES

EFFECTIVE : JANUARY 2, 1975

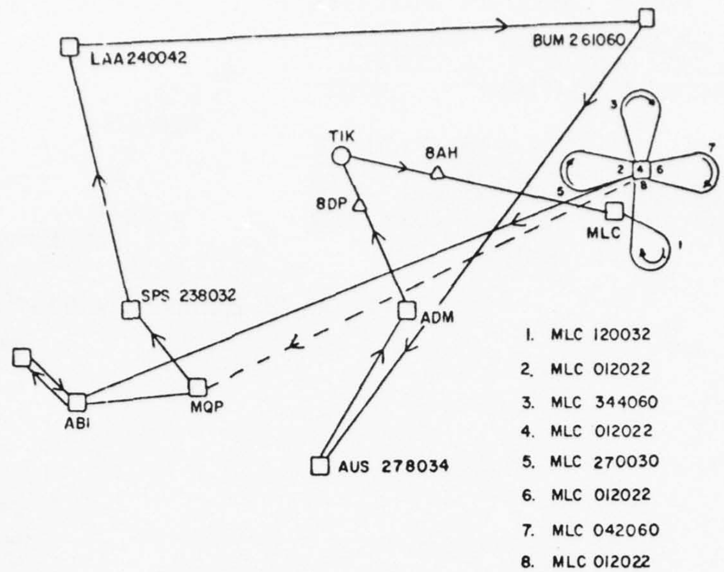
OKLAHOMA CITY ALC FLIGHT TEST - TINKER AFB
MISSION PROFILE ASH 1, OAK 1 (B52)

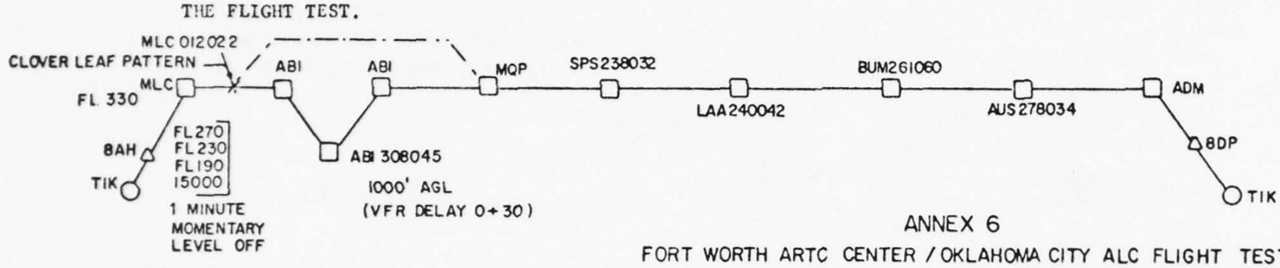
(1) ROUTE: ASH 1 - TIK. 8AH2. MLC..
MLC 120032..MLC 012022..MLC
344060..MLC 012022..MLC 270030..
MLC 012022..MLC 042060..MLC
012022..ABI..ABI 308045/D0+30..
ABI..MQP..SPS 238032..LAA 240042.
BUM 261060..AUS 278034..ADM..8DP
TIK.
OAK 1 - TIK.8AH2. MLC..
MLC 120032..MLC 012022..MLC 344060..
MLC 012022..MLC 270030..MLC 012022..
MLC 042060..MLC 012022..MQP
SPS 238032..LAA 240042..BUM 261060..
AUS 278034..ADM..8DP..
TIK.

(2) ALTITUDE: AS REQUESTED

(3) TEST: NAVIGATIONAL, FLIGHT CONTROL, SRAM

(4) REMARKS: OFF COURSE VECTORS OR ALTITUDE CHANGES DURING CLOVER LEAF AT MLC 012022 WILL NEGATE THIS PORTION OF THE FLIGHT TEST.





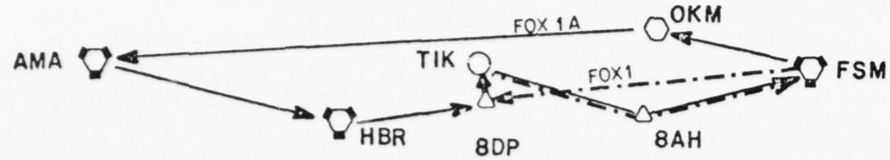
ANNEX 6

FORT WORTH ARTC CENTER / OKLAHOMA CITY ALC FLIGHT TEST BRANCH / DET. 507, 301st TACTICAL FIGHTER WING (AFRes), TINKER AFB LETTER OF AGREEMENT

SUBJECT: **OKLAHOMA CITY ALC FLIGHT TEST BRANCH AND DET. 507, 301st** TACTICAL FIGHTER WING FUNCTIONAL FLIGHT CHECK AND PROFILES

EFFECTIVE: JANUARY 2, 1975

OKLAHOMA CITY ALC FLIGHT TEST– TINKER AFB
PROFILE FOX 1 AND FOX1A (B52/C135)

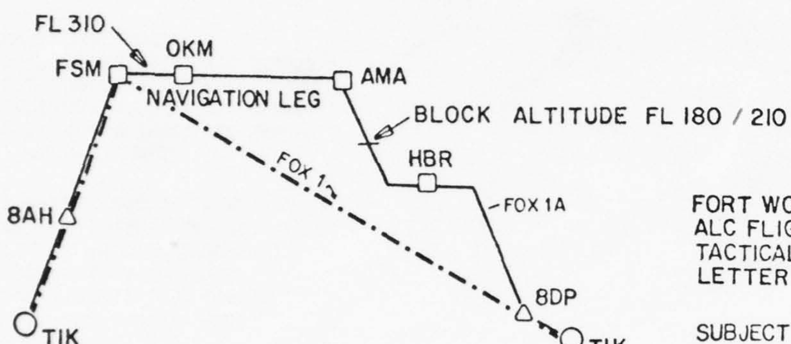


(1) ROUTE
FOX 1: TIK.8AH2.8AH..FSM..8DP..TIK
FOX 1A: TIK.8AH2.8AH..FSM..OKM..AMA..HBR..8DP..TIK

(2) ALTITUDE: AS REQUESTED

(3) TEST: NAVIGATION CHECKS

(4) REMARKS: OFF COURSE VECTORS BETWEEN OKM TO AMA WILL NEGATE THIS PORTION OF FLIGHT



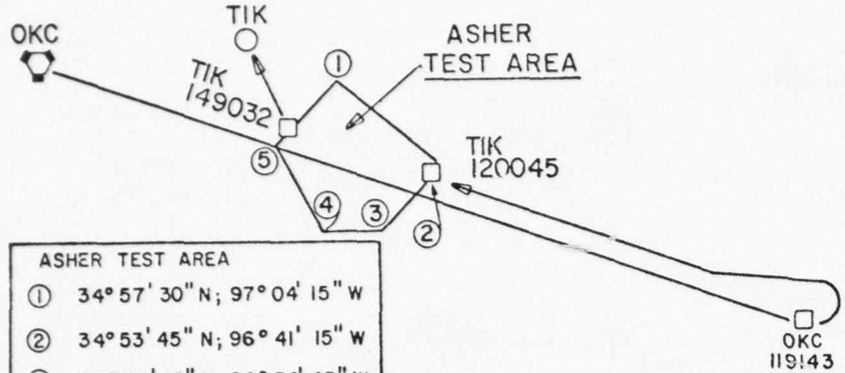
ANNEX 1

FORT WORTH ARTC CENTER/OKLAHOMA CITY ALC FLIGHT TEST BRANCH / DET, 507, 301st TACTICAL FIGHTER WING (AFRes), TINKER AFB LETTER OF AGREEMENT

SUBJECT OKLAHOMA CITY ALC FLIGHT TEST BRANCH AND DET. 507, 301st TACTICAL FIGHTER WING FUNCTIONAL FLIGHT CHECK AND PROFILES

EFFECTIVE: SEPTEMBER 4, 1974

OKLAHOMA CITY ALC FLIGHT TEST – TINKER AFB
MISSION PROFILE JULIE 2 (A7D)

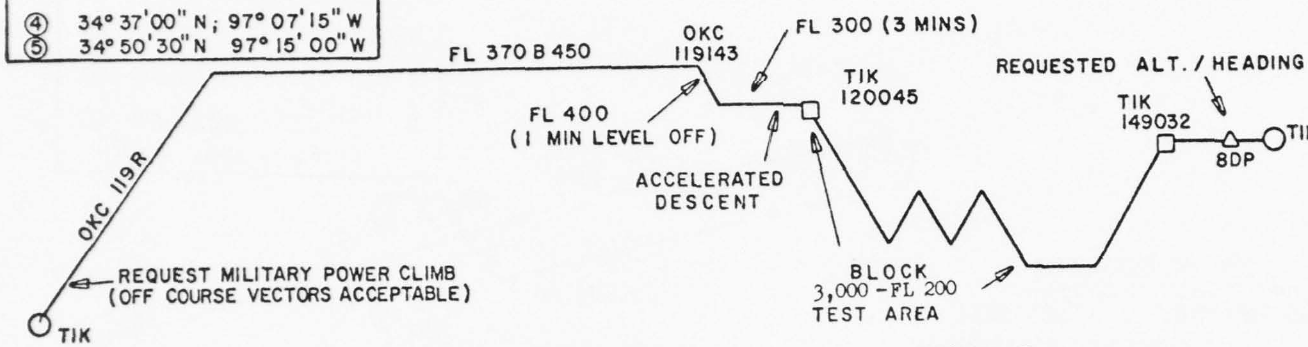


ASHER TEST AREA	
①	34° 57' 30" N; 97° 04' 15" W
②	34° 53' 45" N; 96° 41' 15" W
③	34° 37' 45" N; 96° 56' 45" W
④	34° 37' 00" N; 97° 07' 15" W
⑤	34° 50' 30" N 97° 15' 00" W

(1) ROUTE: TIK..OKC119044..OKC119143..
TIK120045/D0+30..TIK149032
..8DP..TIK

(2) ALTITUDE: AS REQUESTED

(3) TEST: SERVICE CEILING, SPEED CALIBRATION, ENGINE, FLIGHT CONTROL, AVIONIC EQUIPMENT CHECKS



ANNEX 3

FORT WORTH ARTC CENTER / OKLAHOMA CITY ALC FLIGHT TEST BRANCH / DET. 507, 301st TACTICAL FIGHTER WING (AFRes), TINKER AFB LETTER OF AGREEMENT

SUBJECT: OKLAHOMA CITY ALC FLIGHT TEST BRANCH AND DET. 507, 301st TACTICAL FIGHTER WING FUNCTIONAL FLIGHT CHECK AND PROFILES

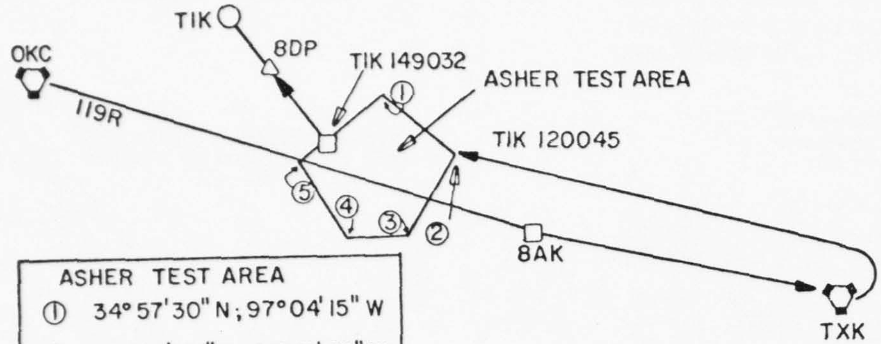
EFFECTIVE: FEBRUARY 27, 1975

OKLAHOMA CITY ALC FLIGHT TEST – TINKER AFB
MISSION PROFILE KILO 3 (F-105)

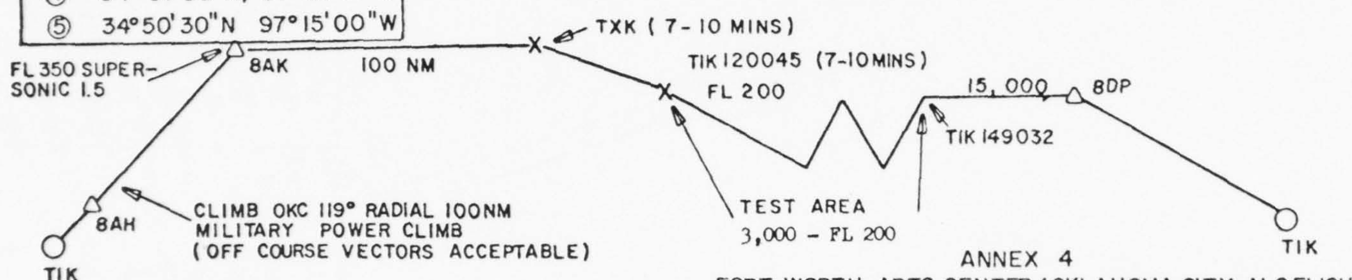
ROUTE: TIK.8AH2.8AK..TXK..TIK 120045/D0+30..TIK149032 ..8DP..TIK

ALTITUDE: AS REQUESTED

TEST: SPEED CALIBRATION, ENGINE, FLIGHT CONTROL, NAVIGATION EQUIPMENT CHECKS



ASHER TEST AREA	
①	34°57'30"N; 97°04'15"W
②	34°53'45"N; 96°41'15"W
③	34°37'45"N; 96°56'45"W
④	34°37'00"N; 97°07'15"W
⑤	34°50'30"N 97°15'00"W



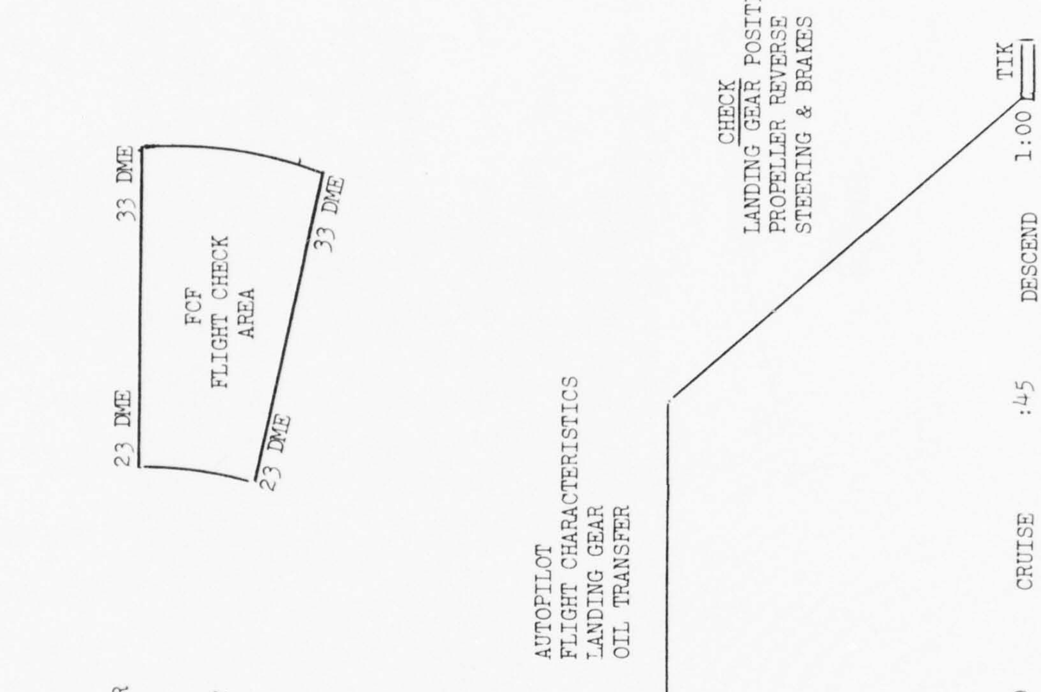
ANNEX 4

FORT WORTH ARTC CENTER/OKLAHOMA CITY ALC FLIGHT TEST BRANCH/DET. 507, 301st. TACTICAL FIGHTER WING (AFRes), TINKER AFB LETTER OF AGREEMENT

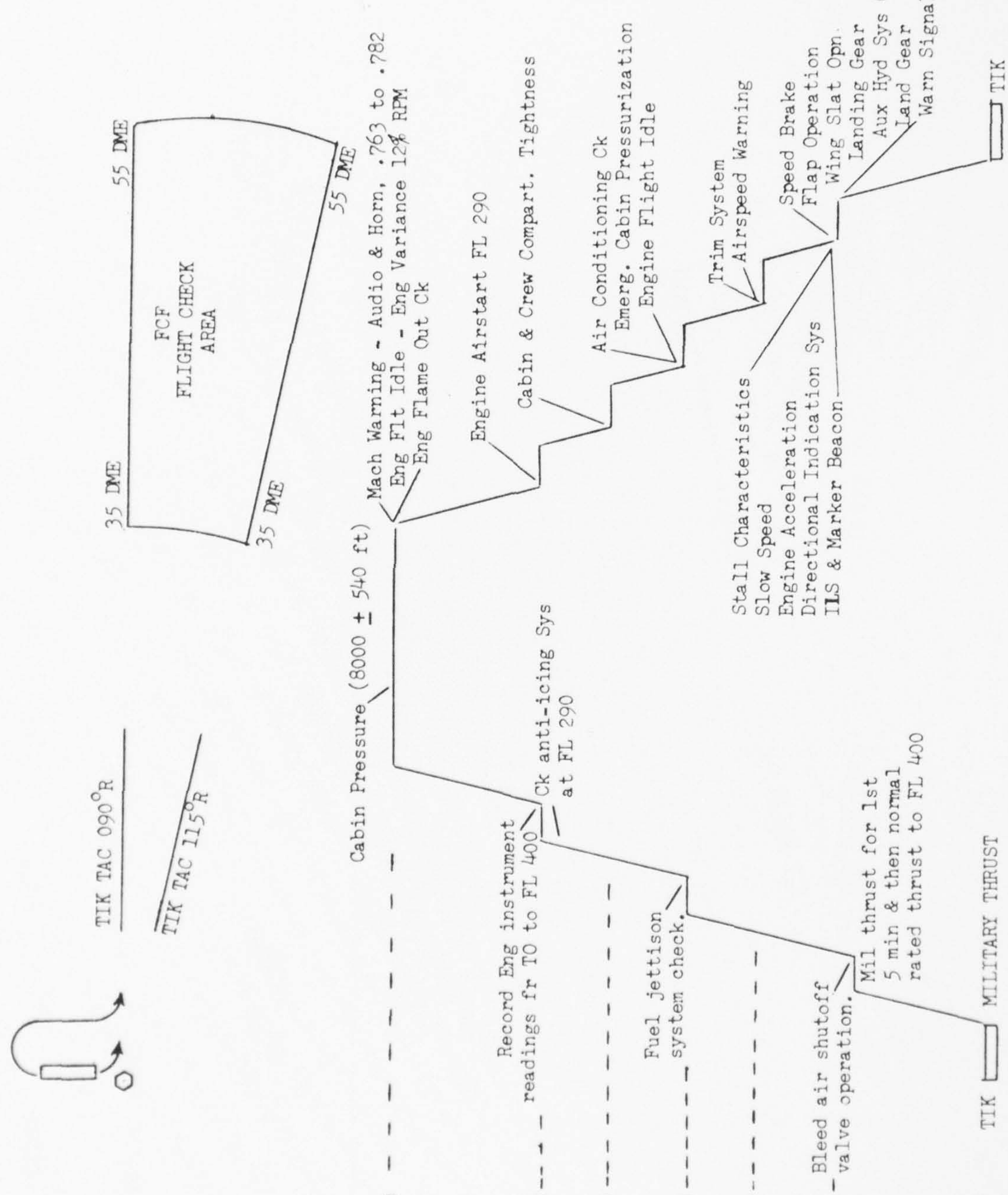
SUBJECT: OKLAHOMA CITY ALC FLIGHT TEST BRANCH AND DET. 507, 301st TACTICAL FIGHTER WING FUNCTIONAL FLIGHT CHECKS AND PROFILES

EFFECTIVE: FEBRUARY 27, 1975

MISSION PROFILE - T-29



MISSION PROFILE - T-39



APPENDIX H

PUBLIC OPINION

ver employees will be civilian, however

Tinker study says force will increase

By James Johnson

Tinker Air Force Base will have more employees, although fewer of them will be civilians, as a result of the new Airborne Control and Warning System AWACS group being stationed there, an Air Force environmental impact study revealed today.

The study was released in preparation for a public hearing May 25 at the Midwest City Community Center on the proposed Air Force move to bring the new wing to the base.

Air Force plans call for bringing the first E3A AWACS plane to Tinker in November with 33 others to follow by 1981.

During that time, the base will be losing civilian workers in previously announced cutbacks, but as the result of extra airmen being brought to Tinker with AWACS, the base will show a gain of 750 jobs over its present 21,387.

The impact study shows that Steed Elementary School will be in an "incompatible area," according to the Air Force's air installation compatible use zone guidelines.

Also, the report said 4,730 residents of 1,507 housing units also will be in the incompatible area.

The Air Force said "incompatibility" includes areas in zones of potential accidents and high noise.

The AWACS airplanes will be restricted to the north-south runway, the report said, and half the 16 takeoffs and landings expected daily by AWACS planes will be over Midwest City.

The planes are C135 transports carrying revolving 30-foot circular radomes atop their fuselages.

The planes contain special equipment to allow them to direct air battles and help direct land and sea engagements. Their radar also can find low-level missiles which otherwise avoid ground-based radar.

In being selected as home base for AWACS, Tinker was picked over Hill AFB, Utah, Kelly AFB, Texas, McClellan and Robins AFB, Ga.

Although 34 AWACS planes are to be based at Tinker, only 21 are expected to be there at any one time. The rest will be deployed throughout the world for extended periods, the Air Force said.

As a result of the AWACS unit being assigned to Tinker, a $26.7 million construction program is planned, mainly in portions of the base already intensively developed.

However, a possible 450 housing units for Air Force families is being planned at the base. Without being specific, the Air Force said it doubts that many extra base housing units will be built.

The environmental impact study said that by the end of the six-year buildup period, it is likely that there will be 11,711 persons living in 3,464 housing units in the incompatible area.

By then, the incompatibility area also will include East Side School, the study said.

Retired military persons may find themselves looking elsewhere for medical care as a result of AWACS.

The study said the Tinker base hospital may have to reduce service to retired personnel in order to accommodate the increased number of airmen at the base.

The study said that the transmitters in the planes aren't a hazard to people on the ground when the planes fly above 20,000 feet.

When the equipment is turned on for maintenance at the base, danger from electromagnetic radiation will be minimized, the report said.

The Air Force said copies of the impact study have been sent to the Oklahoma City Main Library and to the Midwest City and Del City libraries.

At the hearing, individuals will be limited to five minute speeches and group spokesmen will have 10 minutes, the Air Force said.

14 MAY 1976 - The Oklahoma City Times

Planned Tinker Fleet To Boost Personnel

By Gypsy Hogan

A proposed Airborne Control and Warning System fleet at Tinker Air Force Base could mean $42 million in base construction over a three-year period and prevent a decline in base personnel which was predicted earlier.

An environmental impact study released by the Air Force on the AWACS program indicates Tinker will have a military employee increase by year 1981, and the local economy will be boosted through the sales of goods and labor.

The 222-page report was released in preparation for a public hearing May 25 at the Midwest City Community Center concerning the base expansion.

The bleak side of the report estimated 4,500 residents in the base area will find themselves living in "incompatible" noise zones as a result of the system's 34 aircraft scheduled to arrive over the next six years.

The report says the first of the planes is due in November, although base officials indicate it may be later.

"As far as I'm concerned, the only effect on persons living in the incompatible zones will be more noise," Col P.G. Reynolds, chief civil engineer at Tinker, said.

Reynolds said night flights will be scheduled.

He said civilian workers will be decreased while military personnel increase to give the base an overall gain of 750 employees over its present 21,387.

The report shows the present total work force would decline by 2,462 without the program.

The E-3A AWAC aircraft are basically Boeing 707s with special radar equipment allowing them to track 300 targets at the same time.

Congress has approved funding of a third of 34 proposed aircraft which cost $32.5 million each. The appropriating body has indicated a desire to keep the fleet at 24, according to recent reports.

"Any reduction in the number actually funded will produce a proportionate deduction in the number of people assigned to Tinker," Col. Reynolds explained. He said the study is based on a fleet of 34 planes.

The study indicates the planes will create an increase in pollution by particulates and hycrocarbon emissions, which already have "excessive concentrations" in the area.

The report indicates the new incompatible areas will generally effect only "scattered residential development" except for the Midwest City area to the north and northwest of the base and including the Steed Elementary School.

"There's no way to know exactly how much this will mean to Midwest City," Irving Frank, director of community development and planning for the community, said Friday.

He did say, however, Midwest City has "an excellent working relationship with Tinker" on the project.

The AWACS planes will be restricted to the north-south runway with half the 16 daily flights planned over Midwest City, the report says.

The report said by the end of the six-year build-up period, there will be a total of 11,711 persons living in 3,464 housing units in the incompatible area.

The study said the AWACS aircraft will have its greatest impact on the area's economy during initial construction, which is projected at $42 million over a three-year period.

To accommodate the increased number of airmen at the base, the study said the Tinker base hospital may have to reduce service to retired military personnel.

Col. Reynolds said the public hearings are scheduled to inform the public "such an activity is coming to the area."

Copies of the environmental statement may be obtained from the Tinker information office. Library copies will be placed in downtown Oklahoma City, Midwest City and Del City libraries.

15 MAY 1976 - The Daily Oklahoman

H-2

Hearing Scheduled On AWACS

A public hearing on the proposed use of the new E-3A Airborne Warning and Control System (AWACS) at Tinker Air Force Base will be 7 p.m. Tuesday at the Midwest City Community Center, base officials said Monday.

The new aircraft is a modified Boeing 707-3208 airframe, which is topped by a 30-foot rotating radome. The Air Force plans to assign the full complement of 34 aircraft by early 1982, if Congress approves the total purchase.

Officials said no more than 21 would operate in the Tinker area, with the others used worldwide for lengthy periods.

The AWACS will fulfill the Air Force needs for airborne surveillance and command-and-control for its tactical and air defense forces, officials said.

Individual speakers at Tuesday's meeting will be allotted five minutes, while group spokesman are limited to ten minutes.

Written statements will be accepted and may be mailed to Dr. Billy Welch, Special Assistant for Environmental Quality, Secretary of the Air Force, Washington, 20330 before June 15. The closing date for including written statements in the hearing record is June 1.

25 MAY 1976 - The Oklahoma Journal

Hearing on Tinker 'flying radar' set

By Suzanne Harrell

Air Force officials will conduct a public hearing at 7 p.m. today in the Midwest City Community Center, 100 N Midwest Blvd., to discuss effects of locating 34 new flying radar stations at Tinker Air Force Base in the next five years.

An environmental impact study on the project stated Steed Elementary School and 1,507 homes are in "incompatible areas" under Air Force air installation compatible use zone (AICUZ) guidelines.

By 1981, 3,464 housing units and East Side Elementary School will be in "incompatible" areas, the study said.

The first Airborn Control and Warning System (AWACS) aircraft is scheduled to arrive in November with the full complement of 34 planes to be assigned by October 1981.

Noise and engine emissions will be the major problems associated with AWACS operations, officials said, as the total daily number of flights will increase about 17 per cent.

No survey was made to determine how many and what type buildings now meet the required degree of noise reduction noted in the AICUZ compatibility guidelines, the report said.

Earlier AICUZ studies indicated additional insulation, caulking and exterior wall protection would be needed in some cases to meet noise standards, along with other "non-conventional" building improvements.

Midwest City officials said the proposed noise reduction standards are not expected to lead to massive clearance efforts such as the Glenwood project.

Oklahoma County voters approved a $10.8 million bond issue in 1973 to clear the Glenwood housing addition in Midwest City after the Pentagon threatened to move Tinker and its 30,000 employees unless the homes under the flight pattern were cleared.

The AWACS environmental impact study estimated a reduction of 2,462 civilian personnel now assigned to the Oklahoma City Air Logistics Center at Tinker and noted other reductions also may occur during the five-year phase-in period.

More than 3,200 persons will be assigned to Tinker in support of the AWACS program through 1981, however, including 3,092 military personnel and 120 civilians, the report said.

The AWACS unit is expected to generate $26.7 million in construction at the air base, officials said.

25 MAY 1976 - The Oklahoma Times

Citizens Rip Zoning Plan

By Gypsy Hogan

Any opposition to plans to locate 34 new flying radar stations at Tinker Air Force Base remained silent at the Air Force's public hearing Thursday night.

Instead, citizens attacked the military's system of zoning the base's surrounding area. The plan estimates that by 1981, East Side Elementary School and 3,464 homes will be in "incompatible" areas.

"They stink," Midwest City Mayor Marion Reed told an appreciative group of about 200 referring to the military's Air Installation Compatibility Use Zone.

"This plan puts 13 square miles of Midwest City out of operation," he said, shaking the printed guidelines, which he called "inaccurate, and immature."

Tinker is located in Oklahoma City but borders Midwest City.

Reed said he has been assured by U.S. Housing and Urban Development officials in Washington, D.C., the agency "is going to do their own thing" and not accept ALCUZ standards.

Maj. Robert DeLuca, the base representative, promised citizens, "The Air Force has no plans of condemning anyone's property."

He said the addition of radar stations, called the Airborne Warning and Control System will not expand "potential danger zones," but will increase "land area exposed to noise."

Maj. DeLuca said Tinker will experience a 28 per cent increase in total flights when all 34 of the planes are in operation. He said the first plane is scheduled to arrive in spring 1977.

The aircraft will be flying at the same altitude as present aircraft with the same 2.5 landing glide slope, he said.

The major said the new planes, called E-3As, have noise levels comparable with F-105s,which have previously been stationed at Tinker.

The program is projected to have a $26 million boost to area economy with a 750-man increase in employment over the base's present 21,387, officials said.

26 MAY 1976 - The Daily Oklahoman

Citizens Endorse AWACS Program

By RAY ATTEBERRY
Of The Journal Staff

Area residents Tuesday night gave a resounding endorsement to the proposed Air Warning and Control System (AWACS) beddown at Tinker in early 1977.

No protest statements were presented against the new Tinker mission in a public hearing held at Midwest City Community Center under requirements of the Environmental Protection Act.

While the estimated 250 Tinker area citizens supported the new mission, however, they were almost as unanimous in opposing a new land use concept which the Air Force has come up with to identify compatible and incompatible uses near AF installations. It has nothing to do with the AWACS program.

Mayor Marion C. Reed of Midwest City seemingly presented the views of most citizens in his statement which becomes a part of the permanent record of the hearing.

"I would like to clear up one thing," the mayor began. "As mayor, I endorse AWACS. I oppose AICUZ (Air Installation Compatible Use Zone).

"The mission you are preparing to bring in here will be a great asset to our community and our nation, where our Air Force is our strength.

"Our city council will oppose this (AICUZ) and will continue to oppose it," the mayor continued in reference to the land use study.

"We are working with HUD (Department of Housing and Urban Development), and at this time HUD does not accept this concept, and will furnish us instruments so we can begin taking our own noise levels."

Earlier in a question-answer period, Mayor Reed referred to the compatible use concept as "inaccurate and adolescent," pointing out

See AWACS on Page 2

26 MAY 1976 - The Oklahoma Journal

Continued From Page 1

that if the AICUZ guidelines were adopted by the city council, it would "wipe out" 1[illegible] square [illegible]

He added that under the proposed guidelines, which have nothing to do with the AWACS mission, Manhattan Island would be incompatible because of a nearby Air Force installation, and all of Dade County, Fla., would be unusable.

Col. John T. Murphy, staff judge advocate at Tinker who presided over the public hearing, said it is regrettable the AICUZ issue became involved in the meeting, but permitted citizens to continue speaking about the compatible land use issue even though it had no bearing on the AWACS question.

One of the most outspoken opponents of the compatible land use study was Harold Hunter, 21-year Air Force veteran who lives in Midwest City and works in Oklahoma City.

"I want to make it clear I am definitely not against AWACS or Tinker," Hunter declared. "I am against the AICUZ comprehensive zoning and the impact this will have on us."

Hunter said most of the residents have lived in the area for quite some time and had experienced the noise of aircraft, "but this is our life, this is our city."

He added that the AWACS mission would not be detrimental to property in the area, but that citizens should organize and oppose the land use guide lines now being recommended by the Air Force.

E.B. Miller of Midwest City called on citizens to give the AWACS proposal 100 percent support.

"I think we've kinda mixed up apples and oranges," he said in reference to the AICUZ issue becoming involved in the AWACS hearing. "We are extremely fortunate the AWACS has been proposed at Tinker.

"It didn't happen by accident, but by design and effort of a lot of people. We are lucky Tinker was selected for this operation."

Miller recalled that when he came to this area 12 years ago Tinker's strength was some 25,000 and 30 aircraft were assigned to the base. Today, the strength of the base is down by some 5,000 and there are no aircraft assigned to Tinker, Miller said.

"I think for that reason, if we are getting an organization in here, we ought to be thankful we have that kind of operation," he said. "The aircraft is much quieter than some others. Others could have been sent that would perhaps be a lot noisier."

Miller said the AWACS mission will help the economy of the area, and the noise factor from the AWACS flights will be "considerably less than what we have experienced in the past."

"From an environmental point," Miller concluded, "I think this is a great blessing."

The AWACS program will add 3,000 military personnel to Tinker's strength and keep personnel above present levels through 1981.

The AWACS program will utilize the E-3A aircraft, a modified Boeing 707 airframe topped by a 30-foot rotating radome, with 34 planes to be in operation by 1981. Of the total aircraft complement, no more than 21 would operate in the local area, with others deployed throughout the world for extended periods.

Col. Bert Underwood, who has been named commander of the 4552nd AWACS Squadron, said some of the $26 million in proposed new construction costs for the project would be for simulator facilities. This will enable the Air Force to conduct much of the AWACS training on the ground.

The commander said Tinker as home base would be responsible for training in the AWACS program.

Other Air Force officers and Tinker representatives on hand to answer questions at the public hearing were Maj. Robert De Luca, project officer for the hearing; Col. Harry Snorek, deputy base commander; Col. P.G. Reynolds, base civil engineer; Maj. Walter Givens, representing base operations; Maj. Andy Hayden, bio-environmental engineer; and Don Raper, base comprehensive planner from plans and programs.

26 MAY 1976 - The Oklahoma Journal, Continued

Tinker operation receives backing

By Suzanne Harrell

MIDWEST CITY — The city council has issued a policy statement supporting operation of the Airborne Warning Aircraft Control System (AWACS) wing at Tinker Air Force Base but termed a controversial noise study for the air base "untested and unproven."

The first of the new flying radar stations is scheduled to arrive in the spring of 1977 with a total of 34 AWACS units to be assigned to Tinker by 1981.

An environmental impact study said the mission will result in a net increase of 750 personnel and $26.7 million in construction projects on base.

However, city officials and Midwest City residents have expressed disagreement with computer noise studies which set up Air Installation Compatible Use Zones (AICUZ) labeling 3,464 homes and two grade schools "incompatible" with scheduled Tinker operations in 1981.

The council's policy statement says AICUZ is "a study prepared by the Air Force without local consultation, advice and input — an untested and unproven study containing recommended guidelines which could have a negative and adverse impact upon the local community."

All council members endorsed the AWACS program.

Their official comments noted that "Tinker Air Force Base is a mainstay in the economic base for Midwest City and Central Oklahoma.

"The city council of the City of Midwest City, with a view toward the national security, expresses support for the beddown of AWACS at Tinker Air Force Base.

"The city expresses the continued intent to cooperate in the best interest of the members of this community with the U.S. Air Force at Tinker to provide a suitable living environment within the corporate limits of Midwest City while providing for the protection and integrity of all necessary operations at Tinker Air Force Base," the statement concluded.

14 JUNE 1976 - The Oklahoma City Times

APPENDIX I

PROCEEDINGS OF PUBLIC HEARING

CONCERNING DRAFT ENVIRONMENTAL IMPACT STATEMENT

RE

BEDDOWN OF THE AIRBORNE WARNING AND CONTROL SYSTEM (AWACS)

AT TINKER AIR FORCE BASE, OKLAHOMA

HELD AT THE MIDWEST CITY CIVIC CENTER

ON

25 MAY 1976

PROCEEDINGS OF PUBLIC HEARING CONCERNING DRAFT ENVIRONMENTAL IMPACT STATEMENT REGARDING BEDDOWN OF THE AIRBORNE WARNING AND CONTROL SYSTEM (AWACS) AT TINKER AIR FORCE BASE, OKLAHOMA.

The hearing was called to order at 1915 hours, 25 May 1976.

COLONEL MURPHY: Good evening ladies and gentlemen. I am Colonel John T. Murphy, Staff Judge Advocate, Tinker AFB Oklahoma, and have been designated as Presiding Officer for the Draft Environmental Statement Hearing regarding the Beddown of the Airborne Warning and Control System (AWACS) at Tinker Air Force Base.

The purpose of this hearing is to provide information to the public regarding the AWACS Beddown and to record the opinions of interested persons for evaluation by the Department of the Air Force. Notice of this proceeding has been published in the Federal Register as required by law.

My function at this proceeding may be more accurately described as a Moderator. The Presiding Officer at such a hearing has three functions: (1) To maintain an orderly hearing, (2) To insure the proceedings are recorded, and (3) To insure all interested persons are heard.

However, a little clarification is necessary with regard to my mandate to insure all interested persons are permitted to speak. The Presiding Officer may limit the right to be heard when: (1) The comments are extraneous to the object of the hearing. (2) The comments exceed the time limits published in the Federal Register. (3) The comments become repetitive, or (4) An uncontrollable disorder or other good cause exists.

I should advise you that I have not, nor will I in the future, make any recommendations or decisions regarding the AWACS Beddown at Tinker AFB, nor do I possess any technical expertise in this subject area.

The ground rules of this proceeding are as follows: (1) Major Robert DeLuca is the Project Officer for AWACS Beddown. He and his assistants will provide a full explanation of this proposed action. Then, I will open the proceeding to your questions. Any questions which cannot be answered at this time will be answered by mail. When there are no more questions regarding the Air Force Presentation, I will recognize individuals who have indicated a desire to make a statement. (2) Individuals speaking on their own behalf will be limited to five minutes. Individuals speaking on behalf of a group will be afforded 10 minutes. Only one person may speak from any group and yielding of time to another person or group will not be permitted. Written statements, in addition to or in lieu of oral presentations, will be accepted. The closing date for including written communications in the hearing record is 1 June 1976 and should be addressed as follows: Colonel John T. Murphy, OC-ALC/JA, Tinker AFB OK 73145.

This proceeding is being transcribed verbatim by Mrs. Linda Cooper.

Are there any questions concerning the ground rules I have just delineated?

Has everyone who wishes to have a copy of the record, a copy of the final Environmental Statement, or who wishes to make a statement at this proceeding, completed a card at the registration desk? If not, please do so at this time.

I note there are many distinguished Public Officials in the audience, whom I will introduce at this time:

I will start with the folks from Midwest City, because that is where I live. Heading the list is His Honor, Mayor Marion Reed, Mayor of Midwest City, and Councilman James R. Matthews.

I would like for you to know that at this time the City Council is having a meeting tonight and there is some business that could not be put off, however, after that business, the other members of the Council are expected to be joining with us. From the Staff of Midwest City: Mr. Irving Franks, City Planner, and Mr. Grover Phillips, Chamber of Commerce, Midwest City.

Our neighbors from Del City are represented tonight by: Mr. Leo Tinsley, Councilman; Mr. Dale Baker, City Manager; Mr. John Brown, Director of Public Works; and Mr. Dale Ross, Manager, Del City Chamber of Commerce.

From Oklahoma City: Mr. Carl Friend, Senior Planner.

I sure hope I haven't missed anyone. If there are any other Public Officials in the audience, I ask that you please stand and identify yourself:

MR. MORGAN: Odel Morgan, Association of Central Oklahoma Government.

MAYOR REED: Colonel our Councilmen just arrived.

COLONEL MURPHY: Ok.

MAYOR REED: I will make an explanation about the Council, we had two Bid Advertisements for tonight, and we had to open those bids and four of the Councilmen stayed there to open the bid and we have recessed our regular meeting to tomorrow night, didn't we Vice Mayor?

VICE MAYOR: Yes Sir. 7:00 tomorrow evening.

COLONEL MURPHY: For those who just joined us: Mr. Lynn Fry, Councilman; Ms Dorothy Zachry, Councilman; Mr. Claude Rigsby, Councilman; Mr. James Husley, Councilman; and Mr. Marvin Almon, Councilman.

They have with them an array of other officials for the City: Mr. Jerry Wade, City Manager; Mr. David Miller, Assistant City Manager; Mr. John Bates, City Engineer, Mr. Jay Tier, Personnel Director; and Mr. Ed Ferrish, City Attorney.

Here tonight from the Oscar Rose Board of Regents: Mr. Norris Price.

It is now my pleasure to introduce the AWACS Beddown hearing Project Officer, Major Robert DeLuca, Bob will introduce his assistants and then commence with the Air Force presentation.

MAJOR DELUCA: Good evening, ladies and gentlemen. Welcome to this Public Hearing on the Draft Environmental Statement on the proposal to locate a Wing of E-3A "AWACS" aircraft at Tinker Air Force Base.

Before I begin my presentation, I would like to introduce some knowledgeable gentlemen who are here with us tonight to insure that you receive the best possible answers to your questions. May I present: Lt Colonel Snoreck, Deputy Base Commander; Colonel Underwood, Commander of 4552 AWACS Sq; Colonel Reynolds, Base Civil Engineer; Major Givens, Base Operations; Major Hayden, Bioenvironmental Engineer; Mr. Don Raper, Directorate of Plans and Programs; and Mr. Dean Holt, Base Comprehensive Planner.

Although it is the Air Force's intention to establish a Wing of 34 AWACS aircraft at Tinker AFB, the annual appropriations from Congress will establish the total number to be included in the Air Force's inventory and subsequently the number of aircraft to be assigned to Tinker AFB. For the purposes of this Draft Environmental Statement, the maximum 34 airplane complement has been assumed so as to project the maximum possible impacts.

The AWACS, or Airborne Warning and Control System, is a modified Boeing 707-320 Airframe, topped by a 30 foot rotating Radome that can detect, track, and manage -- in an air battle sense -- large numbers of aircraft at all altitudes down to treetop levels. It can also contribute to the command and control of land and sea forces. Previous to AWACS, Airborne Radar Systems looking down at airborne targets flying over the ground, could not readily distinguish between radar energy reflected from such targets and that reflected from the ground. AWACS provides this capability.

The aircraft weighs approximately 180,000 pounds empty and 325,000 pounds filled, and has a length of 153 feet with a wing span of 146 feet. It can cruise at a speed of 450 knots at an altitude of 30,000 feet. It is manned by a flight crew of four and an operations crew of thirteen.

The engine to be used on the production four-engined E-3A aircraft is the TF-33-PW 100A, the same basic engine used currently on the four-engined C-141 transport. This engine is already part of the Tinker Depot Overhaul Program.

I would now like to show you a short, seventeen minute film which will give you a visual picture of the E-3A and discuss its AWACS capabilities.

May I have the film please?

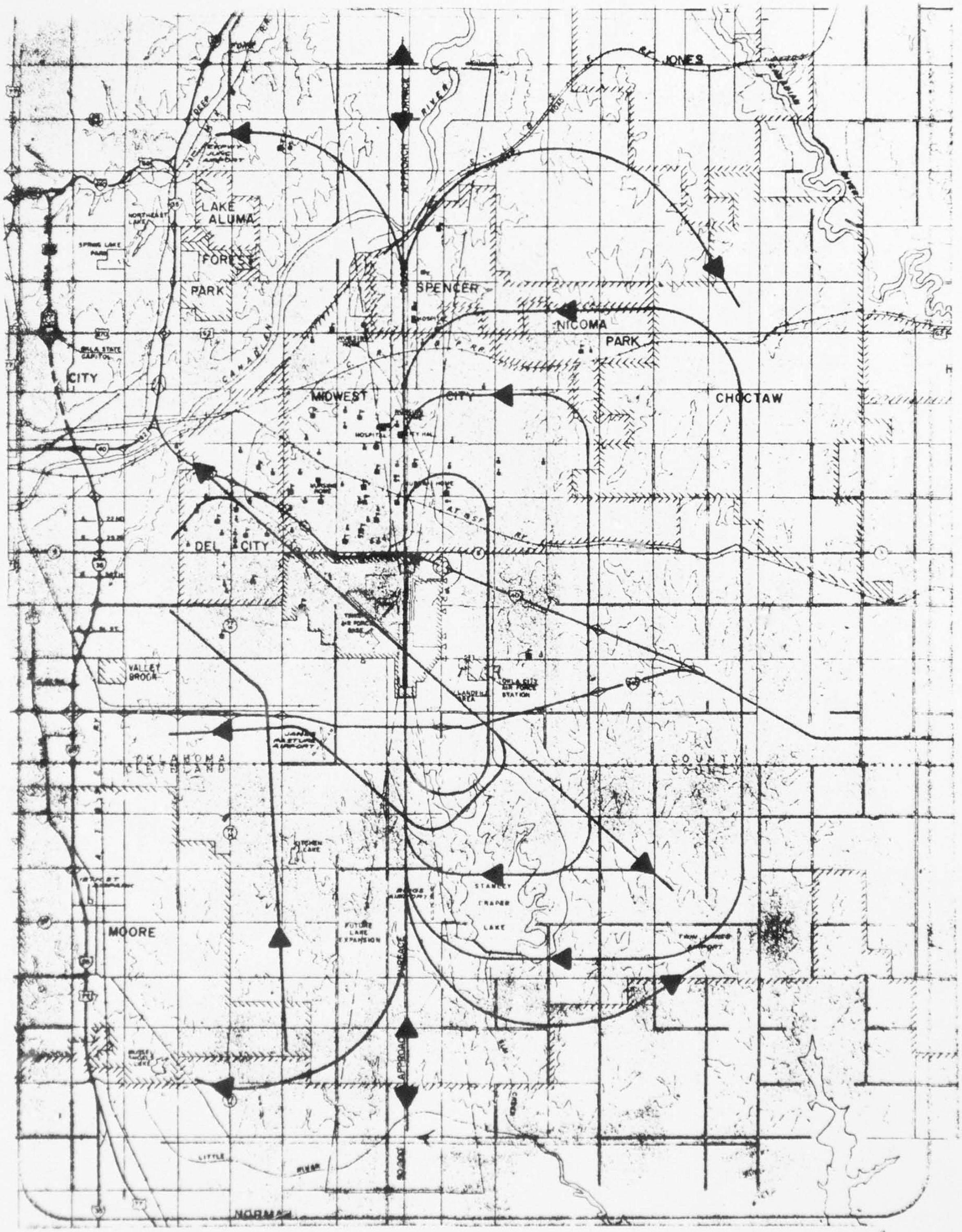
(The film describing the E-3A was shown to the assemblage.)

MAJOR DELUCA: The first aircraft had been programmed to arrive in November 1976, but this has since been changed to the Spring of 1977. The full complement is to be operational by October 1981.

As I mentioned earlier, the AWACS Wing will consist of 34 aircraft. When operational, however, no more than 21 aircraft are envisioned to be operating in the local area, as the remainder will be deployed throughout the world for extended periods of time. It is anticipated that daily take-offs and landings at Tinker will increase by 8 each while go arounds, that is, approaches to the runway without an actual landing, will increase by 47. This a total increase of 63 events per day or a 28 percent increase in the total Tinker flying operation.

AWACS will fly the same flight paths used by aircraft currently based at Tinker, with the exception that the E-3A will not use the crosswind runway. These flight paths are shown on this slide. Landings and take-offs will generally be under instrument flight rules rather than visual flight rules. (Viewgraph #2)

Principle impacts associated with the AWACS Beddown are related to the operational characteristics of the E-3A in terms of noise and engine emissions. The noise levels of the C-141 aircraft which as I previously stated has the same basic engine as the AWACS aircraft have been measured by precision instruments while the aircraft were taking off, maneuvering, and landing. In addition, these measurements were taken for other aircraft utilizing Tinker. With these data, comparisons of the relative noise levels of the aircraft for a single event, such as a takeoff can be made. (Viewgraph #3)


JONES
LAKE ALUMA
FOREST PARK
SPENCER
NICOMA PARK
MIDWEST CITY
CHOCTAW
CITY
DEL CITY
VALLEY BROOK
OKLAHOMA
CLEVELAND
COUNTY
STANLEY DRAPER LAKE
MOORE
NORMAN

Viewgraph #2

AWACS

ENVIRONMENTAL STATEMENT

- PRINCIPLE IMPACTS
  - NOISE
  - ENGINE EMISSIONS

Viewgraph #3

This slide shows a comparison of take-off noise levels for the E-3A and the F-105, another aircraft operating at Tinker. Along the horizontal axis at the bottom of the slide, is plotted the distance from the perceiving individual to the source of the noise of the aircraft. Along the vertical axis or along the left hand side of the slide is what we call the "Sound Exposure Level", or "SEL". The "SEL" is a calculated measure of annoyance for a single event that contains both subjective and objective noise factors, including sound pressure level, sound frequency distribution and duration of noise.

As shown, the E-3A has a lower annoyance level than the F-105. (Viewgraph #4)

In the approach or landing phase, the noise comparison of the two aircraft looks like this. (Viewgraph #5)

From an overall viewpoint, however, the AWACS noise impact will be somewhat greater than currently experienced; a direct result of the increased number of aircraft operations, rather than from absolute noise levels which we saw are actually lower.

Computerized programming of these same type of noise measurements from the E-3A, the F-105's, A-4's and other aircraft operating from Tinker, has resulted in a determination that the total land area exposed to noise will increase. The maps, displayed over here on the blackboard depict this increase.

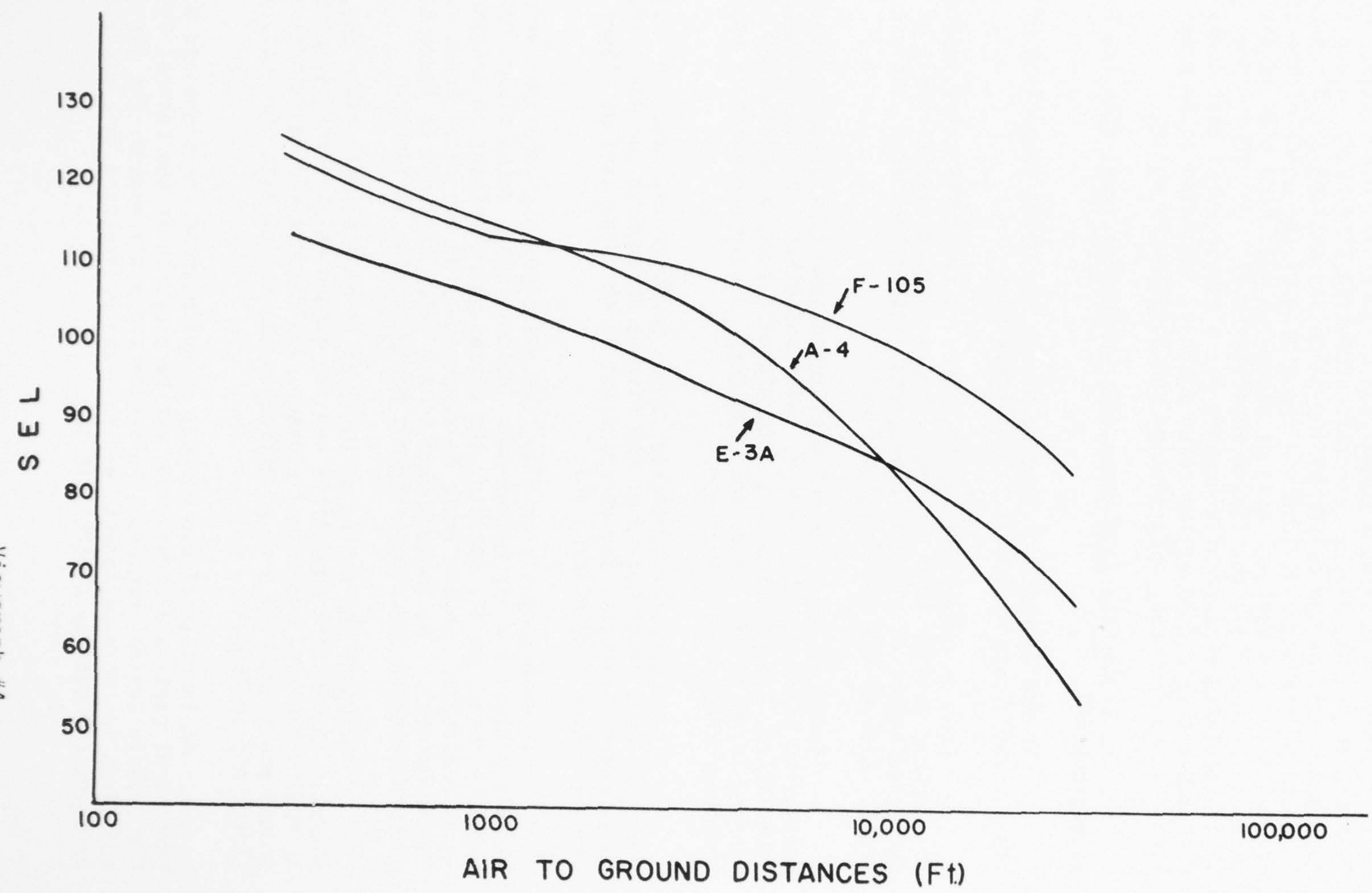
These computer generated curves consider the number of missions flown per day, distribution of the flights throughout the day, aircraft noise characteristics, day versus night flights and various flight patterns used at Tinker. (Viewgraph #6)

In examining air quality, two emission considerations were evaluated: Visible exhaust and air pollutants. While visible smoke plumes have little physical impact on air quality, the plumes can represent an annoyance to local residents. Engine smoke is measured by an empirical index called a "Smoke Number". The Smoke Number of the AWACS aircraft is lower than the numbers reported for other aircraft now operating at Tinker.

Although the engine of the E-3A is a relatively clean one, the increase in aircraft operations and its ground related activities such as engine run-ups, added fuel storage requirements and additional aerospace ground equipment will have an effect on the anticipated air quality of Tinker AFB in 1981.

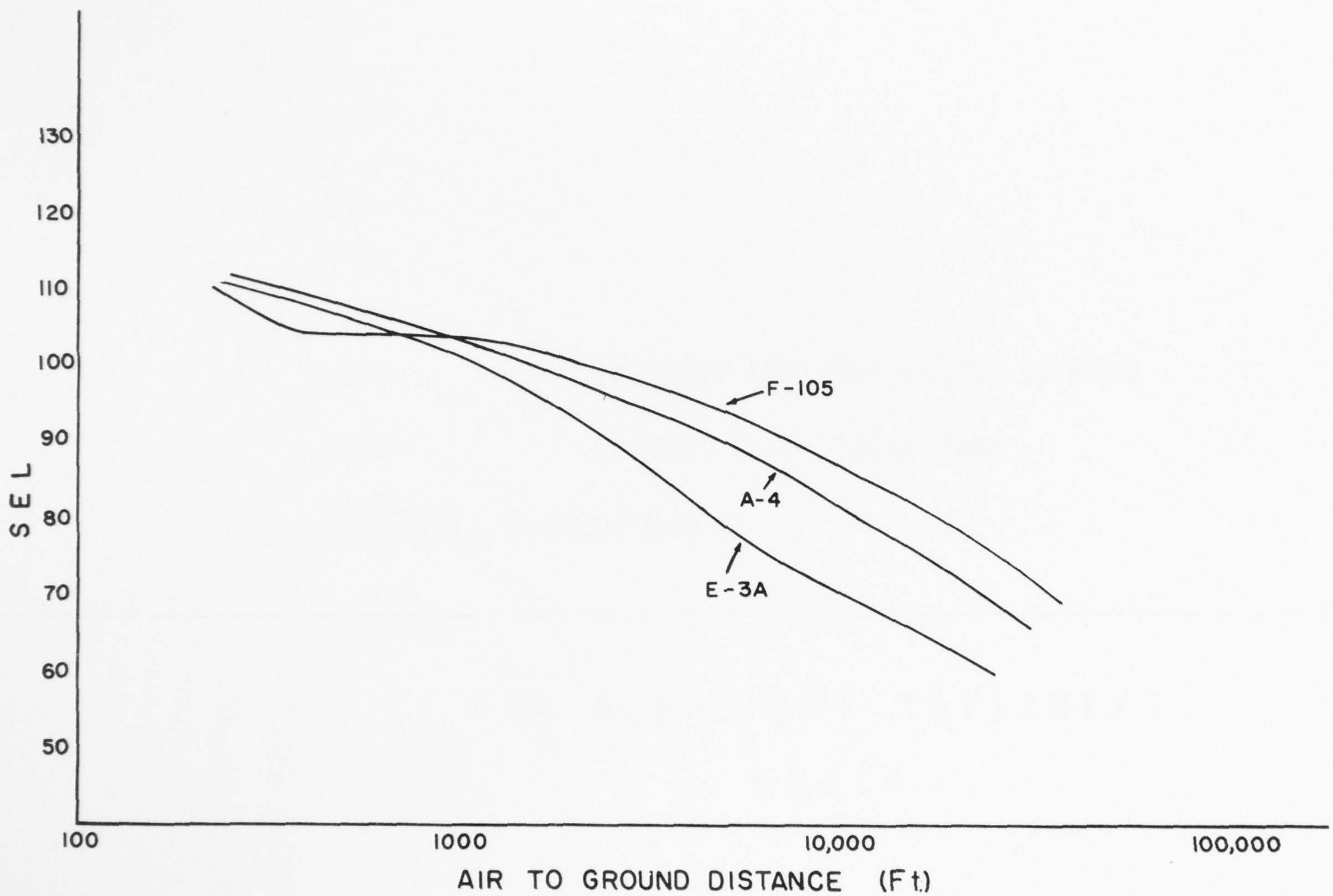
An increase of 0.5 percent of Hydrocarbon emissions and 0.4 percent of particulate emissions can be expected in the Central Oklahoma Air Quality Control Region. The Region presently exceeds the air quality standards in these pollutants and this can be expected to aggravate an existing air quality control problem.

COMPARATIVE NOISE LEVELS - TAKEOFF



Viewgraph #4

COMPARATIVE NOISE LEVELS - LANDING



Viewgraph #5

AWACS

ENVIRONMENTAL STATEMENT

- NOISE IMPACTS
  - ABSOLUTE NOISE LEVELS LOWER
  - INCREASED LAND AREA EXPOSED TO NOISE

Increases in emission of other pollutant classes will not result in adverse impacts. (Viewgraph #7)

There will be a large increase in military personnel at Tinker due to AWACS. This increase combined with other reductions will provide an overall increase of approximately 750 personnel with a related impact on local housing and school systems.

Construction and alteration of facilities to support AWACS will add over $26 million to the area and regional economy. (Viewgraph #8)

Numerous criteria were used in selecting a site for the proposed location of the AWACS Wing. Among these were availability of depot and intermediate level maintenance capability, location with regard to deployment to the Pacific and European theaters, cost effectiveness or the amount of tax dollars required to provide E-3A operating and maintenance facilities and environmental considerations including flying weather, air traffic, air pollution and economic impact.

All USAF bases except the five Air Logistics Centers were eliminated due to the lack of depot maintenance capability.

Of the five ALC's, Tinker ranked first due to existing E-3A engine and airframe maintenance capability, optimum location, minimum cost and least adverse environmental impact.

The alternative of no action at all is considered unacceptable in light of national defense requirements and objectives. (Viewgraph #9)

This concludes my overview of the AWACS Environmental Statement.

COLONEL MURPHY: I would like to thank Major DeLuca for his presentation. I will now entertain questions. I would ask that if you would like to mention your name and address so that it can be recorded, we would appreciate that. You can ask a question, then I will repeat it so our recorder then we will have an answer. If the answers are not available we will need your name and address, because we will mail your answer to you. At this time I would like to entertain questions.

UNIDENTIFIED PARTICIPANT: How will the noise of the product of this study -- How does it relate to the situation we have experienced in the past? How does the noise level of this product, computer product for the projected flights compared with maximum we have experienced from our past workload at Tinker -- computerized the projected flights, wondering if it computerized the impact of what we experienced in the past?

MAJOR DELUCA: Sir, on the blackboard, we have what we call the AICUZ computerized contours.

UNIDENTIFIED PARTICIPANT: I am comparing, is the present the most flights and the greatest noise hazard we have experienced during the life of Tinker?

AWACS

ENVIRONMENTAL STATEMENT

- AIR EMISSION IMPACTS
  - VISIBLE PLUME
  - EMISSIONS INCREASE
    - 0.5% HYDROCARBONS
    - 0.4% PARTICULATES

AWACS

ENVIRONMENTAL STATEMENT

- ECONOMIC FACTORS
  - PERSONNEL INCREASE
  - CONSTRUCTION AND ALTERATION FUNDS

AWACS

ENVIRONMENTAL STATEMENT

- BASE SELECTION CRITERIA
  - DEPOT MAINTENANCE CAPABILITY
  - LOCATION WITH REGARD TO DUAL THEATER DEPLOYMENT
  - COST EFFECTIVENESS
  - ENVIRONMENTAL CONSIDERATIONS

Viewgraph #9

MAJOR DELUCA: During the life of Tinker?

UNIDENTIFIED PARTICIPANT: That is my question.

MAJOR DELUCA: Sir, I haven't been here that long, however, the present mission as now envisioned and as envisioned to increase when the AWACS aircraft

UNIDENTIFIED PARTICIPANT: How does it relate to when the 443rd was here? Same engine same aircraft.

COLONEL SNORECK: I think as I showed you the T-F 33 engine is the same one that is on the 141. The missions will be very similar, in fact, I think in the 141 Wing that we had here before, the Training Wing, I think we had 36 aircraft which were operating around-the-clock in a training type mission, so this will probably be --

UNIDENTIFIED PARTICIPANT: Less than when they were here?

COLONEL SNORECK: Yes, I would say that would be my guess.

UNIDENTIFIED PARTICIPANT: The second part of that question is, how was the 65 noise level arrived or concluded to be the range while you were in or outside of the conditional area? Why not 55 or 70?

MAJOR DELUCA: The Air Force has compatibility guidelines which are in the back of the book. In each of these contour areas, the Air Force has recommended different compatible activities that can be going on within that contour --

UNIDENTIFIED PARTICIPANT: What is the basis for selecting 65 as the area whether it be outside --

I-1 MAJOR DELUCA: It was done by Air Force experts in the noise and annoyance levels.

UNIDENTIFIED PARTICIPANT: You don't know what the technical basis --

MAJOR DELUCA: No, it is all in the computer.

I-2 MAJOR HAYDEN: Experimental data, various experiments with different systems versus different levels and peoples reaction to those levels and 65 to 75 gets certain reactions. Above 75 you get a more adverse reaction, and below 65, we found the general reaction is less severe.

UNIDENTIFIED PARTICIPANT: Was any of the local topography environment included in this computer study or is this a theoretical analysis.

MAJOR DELUCA: Theoretical analysis, based on local flying activity and the time of days they fly.

MRS. PORTER: My name is Mrs. Ray Porter, 869 E. Steed, Midwest City, Oklahoma 73110.

In the paper, it said that Steed School was incompatible, what are they going to do?

I-3 MAJOR DELUCA: The first time you asked that question, you said why is it incompatible, it ---

MRS. PORTER: What are they going to do?

MAJOR DELUCA: What is the Air Force going to do? The Air Force is identifying these areas and telling the people and telling the City Planning and everyone else concerned what the areas are based on all the analysis and research that we have done -- we are telling everybody, this is what the situation is. It is up to the local communities and planning commission and local people to take action on whatever, not recommendations, but the information that we have provided.

MRS. PORTER: Does that mean that the school may be shut down? Relocated?

MAJOR DELUCA: I can't tell you that.

D. DOWDELL: My name is D. Dowdell, 801 E. Bouse Drive, Midwest City, Oklahoma, 73110.

Would you please tell me simply, what do you mean by the term incompatibility? What does that mean to us people who are living in that area? Incompatibility.

MAJOR DELUCA: The Air Force has identified a number of zones on these maps, which is thirteen zones. We have run tests on noise exposure levels, noise annoyance as we stated before. Accidents, they analyzed accidents over the past 8 years Air Force Wide and identified 3 accident potential zones where the most accidents occur around an Air Force Base. Those are the zones directly off the ends of each runway. The noise forecasts or noise exposure forecast and noise contours are all the flight information for the bases fed into the computer, and they come out with these contours, all the Air Force is saying that within certain zones, there are certain types of compatible use, that communities can make to live compatibility with an Air Force Base. We are just identifying that within these zones a residential single family dwelling could be because of either high noise exposure forecast or accident potential, this is actually incompatible use for that area. Depending on what zone you are in some of the incompatible uses due to noise exposures, this can be corrected by additional installation and storm windows, that type of thing can be cut down on the noise exposure as we put into the computer.

That is basically what incompatible means. Incompatible from the local community and the Air Force Base. We are not saying that you absolutely cannot live here, we are just saying that based on our forecast for our research and analysis for past information it is incompatible to have a residential dwelling within certain areas, unless it has sound attenuation, or depending on the areas and the people.

D. DOWDELL: Thank you, and I understand that. Then I need to ask you then, actually a person could live there from Phase I that you just talked about if he wanted to take the chance of a plane falling on him - he could go on and live there. The second thing is he could live there, but he is going to have a high noise level. Does that mean that it could effect him personally? Physically?

MAJOR DELUCA: By saying high noise level, I have tried to tell you in my briefing what those noise exposure levels meant. It doesn't mean noise exposure to your hearing that will affect your hearing or affect your body. It does mean we measure annoyance level - and obviously the higher the annoyance level, it could affect the body, but most of the incompatible areas has to do with the annoyance.

HAROLD HUNTER: My name is Harold Hunter, 2409 N. Towery, Midwest City, Oklahoma 73110.

This directed directly to you Major, if you please Sir. You say that the noise level would be - the Steed School would be incompatible with the noise level, in other words, what you are saying they could operate, but it is not advisable. Ok now then if we lose our school in that area, do you have any statistics detecting the devaluation of property in these zones. Most of us over in that area, a bunch of us, have been there 10-12 years or longer. Some of these people that live in this area are retired or planning to retire within the next year, two, or three years. They have bought these places, most of them are pretty well paid off, but then if it is incompatible, if the noise level and pollution level is going to hurt the area, we lose our school, that hurts our property, what is that going to do to us now?

MAJOR DELUCA: The area that you are talking about Sir, if you look at the map later on, I believe that we are going to have a short break, when you look at the map you will see that the area you are talking about really has no change from the present category. The mission that we are talking about coming in here has no effect on that area that you are talking about, the Steed School was previously identified as incompatible, and that is not the thing we are talking about this evening. The Steed School has been identified as being in one of the accident potential zones. This evening, we are talking about what effect the AWACS Mission will have on the local community and on these noise contours - the area you are talking about is already identified under the present Tinker configuration.

HAROLD HUNTER: You mean to tell me - that with this new wing coming in essentially it will have no greater effect on us than we have right now. Is that your concept?

MAJOR DELUCA: Yes Sir. In the area that you are talking about.

HAROLD HUNTER: Then why in the paper, two weeks ago, in the Daily Oklahoman & Times, why did they state that Steed would be incompatible with this new wing?

MAJOR DELUCA: I can't vouch for what is in the paper, Sir. However, -

HAROLD HUNTER: This is what I want clarification on. If it is incompatible and we may have to close our school, that devaluates our property greatly around there. There are a bunch of us who would like to stay in this area.

MAJOR DELUCA: As I told this lady here, (Porter), I don't know what they are going to do about the school, that is not up to the Air Force, the Air Force has identified the area. The Steed School in that area was identified previously before the AWACS impact. It is identified under the present mission, I don't believe that it is something that we really have to argue about this evening, it has been identified previously, AWACS is not going to have any further effect on that area.

HAROLD HUNTER: You misunderstood me. The idea is a question and answer session, if you don't have the question, I am supposed to get an answer, right?

MAJOR DELUCA: Yes Sir.

HAROLD HUNTER: All right, no disrespect against you, this was just a question for my benefit, and I was wondering if you had a reasonable answer, or if you had any statistics that would back it up or anything in this order. Now continuing on this same line - this we need to know about. Now somebody has an answer - now this, I don't know why that this meeting wasn't publicized but one time, very small, in the paper this morning.

MAJOR DELUCA: There was a large article two weeks ago.

HAROLD HUNTER: Yes Sir, and everybody on our block missed it. Everybody for two blocks around missed it. I am a nosey old neighbor, I got out and said: "Hey did you see this"? They said no. What's it all about? I said: "I don't know, but I am going over to the meeting Tuesday night and find out". That is the reason I am here, I am asking questions, I want to know what it is going to do to me.

GROVER PHILLIPS: Has there ever been a hearing on AICUZ?

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MAJOR DELUCA: AICUZ is not something that the Air Force is imposing on everybody. AICUZ has been developed by the Air Force for presentation to the local community, to show compatibility.

GROVER PHILLIPS: When is AICUZ going to be presented as a concept?

I-4 MAJOR DELUCA: AICUZ has been presented to the Association of Oklahoma Governments, in January.

GROVER PHILLIPS: But there has never been a public hearing of this nature on it?

MAJOR DELUCA: No Sir.

GROVER PHILLIPS: To assess the reaction of the public to AICUZ.

MAJOR DELUCA: No Sir.

MS KIRK: My name is Pat Kirk, 812 E. Towery Dr., Midwest City, Oklahoma 73110.

I don't want to beat around the bush, I want to know if the Air Force is going to be able to force me out of my home, or excuse me, I don't mean it that way, I mean is the Air Force going to tell my City Manager and my City Planners that it is either Tinker accepts this new mission or we lose a lot of our employees at Tinker like they did before, and this is what I am interested in, whether the Air Force has any plans.

I-5 MAJOR DELUCA: What we had done and if you have one close you can read that compatibility booklet, we have identified the areas where the most accident potential is. Now between SE 15th and Reno, as you can see, is in the accident potential zone two. Less than 30% of the accidents occur in that area. The compatibility districts that we show on here does not make that a completely incompatibile area. The Air Force like I said before has identified the AICUZ concept to planning commissions throughout central Oklahoma. We are not imposing it on anyone. We have identified it as a concept, we have done all this research and said ok that is what we have found. If anyone wants to act on our data, fine.

BILL MUNSELL: My name is Bill Munsell, 832 N. Towery Dr., Midwest City, Oklahoma 73110.

In other words, what you are telling us is that this Wing is going to definitely come here whether we want it or not, right. Whether the noise level, we can live with it or we can't. In other words it is going to be here and it is up to us to like it or leave it. That is exactly what it comes down to. Like you said, our Steed School yard, you said it was incompatible, well if you are going to put in about 18 or 20 flights a day more, it is going to increase that a heck of a lot more incompatable than it is right now, so it is going to affect us - Steed School - and every area that these planes fly over.

MAJOR DELUCA: The size of the accident zone does not change with the number of flights.

BILL MUNSELL: What about the noise level, also, now if we say that it is going to make it twice or that much more incompatible.

MAJOR DELUCA: The area of why Steed School is incompatible is due to the accident potential zone. It is within one of the accident potential zones and it is a concentration of people that should not be located in that type of a zone.

E. B. MILLER: What is the potential? You are talking about a potential of accidents, what is the potential, is it big, little, or minute?

I-6 MAJOR DELUCA: The potential proceeds from the end of the runway into the clear zone. The clear zone extends from the end of the runway out 3,000 feet. There is approximately - over 50% of the accidents occur in that area. The second zone, there is approximately 39% of the accidents, further out they decrease.

E. B. MILLER: I know that, but percentage of what? How many accidents have occurred and this would be a percentage of that and if it is one out of 10 billion or is it one of 100.

MAJOR DELUCA: Are you referring to the aircraft you were talking about.

E. B. MILLER: Yes, how many accidents have they had? Even the 141s.

MAJOR DELUCA: It is not flying yet, so I can truthfully say that we have not had any, however, the basic airplane is a C-135 and the engines are C-141 engines. If you will check the comparison in the book, it shows that both the C-135 and the C-141 have better safety records than commercial aircraft.

DAVID MILLER: I will also point out that they had the school here flying the trainees in the 141 and they never did have an accident. So you are taking 20% of nothing is still nothing. I think this ought to be clarified, because you are talking about accident potential, really what is it? You never had an accident so you don't have the basis.

I-7 MAJOR DELUCA: Those potentials were identified Air Force wide, they weren't talking specifically about Tinker, they gathered data through the Air Force on locations of accidents, and they have gone to every Air Force Base and said ok some percent of the accidents that have occurred throughout the Air force have occurred within 3,000 feet within the end of the runway. So many more have occurred another 10,000 feet out. That is what they are saying, they are not talking specifically ---

COLONEL UNDERWOOD: I would like to comment, if I might Sir, I believe that one of your comments were, have we had any accidents to date and I believe that Major DeLuca might have left you with the impression that the airplane has not yet flown. If you got a close look at the movie, you will find that this is not altogether true. We have about three of the airplanes in test configuration, just as you have seen them and they are just as they would be here with the same engines and have been flying for quite sometime in the Seattle area, in the Edwards AFB area, and the test area. I cannot tell you exactly how many hours have been flown, but they have been deployed overseas, as well as flown around the United States for several hundred hours. And there have been no accidents and there have been no incidents so I would like to indicate to you that the airplane has been flying for a year or two in the Test Model and they have had no accidents.

COLONEL SNORECK: May I make one more comment, just a clarification very quickly, the accident potential zones, that they are referring to, the clear zone and the APZ 1 and 2, these are based on Air Force aircraft accidents which occurred within a ten nautical mile radius of an airfield. Approximately 350 airplane accidents, the ones they are referring to. Those percentages that they are talking about that percentage of that approximate 350 aircraft. So that is really what we are talking about, these are aircraft of all types, worldwide - not four engines, all types of aircraft.

FRANCES COFFIN: My name is Frances Coffin, 720 Hedge Dr., Midwest City, Oklahoma 73110.

I would like to know, you say that all this noise is going to be just like it was before - after this meeting our property is not going to be worth nothing like it was and if this is going to be none different than what we have been living with, why have the meeting? Why were we even told about it? Is our property going to be condemned?

I-8 MAJOR DELUCA: The Air Force has no plans on condemning anyone's property.

FRANCES COFFIN: Why tell us it is so dangerous then to live here?

MAJOR DELUCA: We are not telling you that it is dangerous to live in the accident potential zones.

FRANCES COFFIN: Yes.

MAJOR DELUCA: We have informed everybody, it is not that it is dangerous, its just that around an Air Field those are the most dangerous areas, its been that way and through our research we have identified these areas and we are just letting everybody know about it.

FRANCES COFFIN: We are going to wait until we have an airplane crash then before they do anything. Right?

MAJOR DELUCA: Before they do what? Condemn your housing?

DON RAPER: I think you folks need to realize something, AICUZ is another program which was developed, maybe started nearly two years ago because of just what we are talking about, airplane crashes. They have taken into consideration all Air Force Bases and we looked at them and they said ok where are the bad zones, where are the danger zones in these areas? What do we need to clear up in order to make it safe for the people around the area, so we developed AICUZ and it covers all Air Force, we have got Warner Robins, your ALCs if you are familiar with them, Hill Air Force Base and all these Air Force Bases. Ok, everyone of them have got this zone and we have a responsibility as the Air Force to tell you what the zone is. Now if the city or the local community want to clear it out, want to make it safe as years progress, fine, but AWACS doesn't affect this zone, very little. After we take a break, look at the difference in here, and it is mainly noise, and that type thing, sure the more flights you have, the more possibility for crash you have - nobody can dispute that. But don't hang AWACS to AICUZ, because it is two different projects.

MARVIN ALMON: My name is Marvin Almon, 9713 N. E. 10th, Midwest City, Oklahoma 73110.

I feel the question that the young lady asked was about why this program was - this meeting was called - I feel that probably we didn't have so much emphasis on environmental impact studies as we do right now, and I feel when we probably had the C-141 Wing come into the city, it probably increased the level to the intensity to what you are talking about, but nobody brought it to the attention of anybody, because the incident was not on environmental impact - is that true or not?

MAJOR DELUCA: True

MARVIN ALMON: You spell out these areas on your map, as a arm of the Federal Government, which the Air Force is - will you notify FHA, VA, and HUD and these other living agencies and spell out to them that these areas are above a certain noise level and then will that cause us any difficulty on getting a loan from one of these agencies?

MAJOR DELUCA: HUD and FHA have their guidelines on what they are going to do with AICUZ. I believe the Mayor has already spoken to HUD, he went to Washington, and had a meeting with HUD and Air Force personnel. HUD has not made any definite decisions yet on the AICUZ here at Tinker. FHA has some guidelines on existing loans will be honored, VA has some guidelines on some statements that they will require from the buyer of housing in this area. Now if Mayor Reed wants to expand on what he learned out of HUD.

MAYOR REED: I wanted to listen to your presentation, and see

what you wanted to tell us. You did tell us that this new group, AWACS
I-9 wouldn't increase our noise level. Probably the most undiscussed thing that should be discussed is the Air Installation Compatible Use Zone
I-10 Study which is a recommendation U.S. wide, Air Force wide, affects 260 Bases in the United States, if I remember correctly. This study is a recommendation to the city council to adopt this planning program in guidelines of these maps. The reason for holding this hearing tonight is in our modern society of Environmental Impact Program (EPA). It is a requirement that any mass change in Tinker AFB that you will hold these hearings. Is that correct?

COLONEL MURPHY: Yes Sir.

MAYOR REED: That is a requirement by EPA our Federal Government and that is the reason they are holding these hearings. To talk about Air Installation and Compatible Use Zones, this was not coordinated by the staff of Midwest City or the City Council, or Oklahoma City or any other city in Oklahoma County or counties in metropolitan areas. It was introduced to myself and ACOG members on Jan 19, 1976, with a phrase in here to HUD that they recommend HUD to adopt it. Immediately we protested, we protested the study, it is inaccurate, excuse me, it's adolescent, because the noise you have in your home from your Hi-Fi is far greater than the noise that you have from a lot of these airplanes. This AICUZ puts 13 square miles of Midwest City out of operation, actually, if we adopt the Air Force program. Now then AWACS will not have any effect or any more effect on Midwest City than any of our Military Programs have had on Midwest City in the last 25 years. We are acquainted with the C-141s and we are acquainted with the KC-135s, we are acquainted with the B-52s, the Milk Bottle Project, B-47s, and we realize this is an Air Force Family as an Air Force Community, that if we have a national emergency tonight, or if we have a hurricane hit the Gulf Coast, we know that the Air Force will deploy all of its liable aircraft in here for their protection. And we expect some noise. Yes, we protested, and we are continually protesting, we do not agree with it, your City Council doesn't agree with it. Yes, I made a trip to Washington DC with Vice Mayor Rigsby, and our Planner with the invitation of Congressman Steed, Senator Bellmon, and Senator Bartlett, and we did have a setto with Under Secretary Hud Meeker and several of the Air Force people. HUD is not having any part of this study at this time - they are going to do their own thing, because in this study and you can correct me Colonel, if you want to. This study shows Dade County Florida completely unacceptable because of noise of aircraft, completely, the total county. This shows 13 square miles of Midwest City by noise. Under their study Mahattan Island is not suitable for human beings because of noise. Go one step further, the City of Lawton, Oklahoma, had the same problem with the big guns - and they have had the big gun for many years, and when they got through making their analysis from the EPA Analysis and the Army Analysis - it wasn't the big guns that were the problem - it was their own generated traffic on their own streets, so if you want to know how your own City Council and how I stand on Air Installation Compatible Use Zone, they stink! They are immature, because they put it

in a computer with no configuration of terrain of the land, buildings, trees or anything else and your City Council continues to fight it until we sink the concept somehow. The only thing that if the City Council passes this program, then we would be the bad guys that told you, you will never improve your house. If it burns up, you won't rebuild it, I hope I have made myself clear.

HOWARD BAIN: With regard to the requirement of the Air Force holding this hearing, the Air Force is only required to hold a Draft Environmental statement Hearing under three conditions. (1) There is a public controversy, and there was no public controversy with regard to this particular project; (2) If there are significant environmental consequences of this program, as you have heard from Major DeLuca already, the effect of AWACS on the present AICUZ configuration is minimal, so the Air Force did not consider it to be a major impact; and (3) the reason that this hearing is being held, is when members of the community can offer significant assistance to the Air Force in adopting its program, in this case, the Beddown of AWACS in the conformance with the community requirements, then it will also have a hearing. It was decided by the Air Force on the basis of input by various local communities in the area, including Midwest City, that you the public would be able to furnish a substantial input to this program, and we are quite appreciative of the fact that you are doing so tonight, but unless one of these three conditions exist under the National Environmental Policy Act, we are not required to hold a hearing such as this. National Environmental Policy Act came into being in 1970. That is why you have not had these types of hearings previous to that time. Col Snoreck, am I not correct, that we have not had any major Air Force input since that time, any programs?

COLONEL SNORECK: Not that I know of.

HOWARD BAIN: And that is why we have not had any hearings of this nature before. With regard to AICUZ, since it is already existing patterns, it is not a change, it is not a Major Federal Action, it is existing trends, and that's why there was no hearing of this nature held with regard to AICUZ.

NEAL TINSLEY: My name is Neal Tinsley, 4308 S. E. 13th, Del City, Oklahoma.

The data which you have developed that shows us propagation lines on your chart is theoretical data, do you have any plan to come up with field data to determine the validity of your theoretical data?

I-11 MAJOR DELUCA: No Sir, we don't have any plans to go out and take actual noise level readings, this is all ---

NEAL TINSLEY: So you do have plans to do it

MAJOR DELUCA: No Sir.

NEAL TINSLEY: Ok, then the second thing is that we are being asked to, both cities, it is only about 3/4 of a mile perhaps of Del City is affected. We are still concerned. If the City Council does adopt this, this means you have got to write an ordinance, and if you

I-12 inject a couple more bits of data into your computer theoretical data, and run a propagation line out an additional distance, and you have got a City Council rewriting ordinances, bouncing back and forth like this which -- is almost an impossibility to fill.

COL SNORECK: We are back to AICUZ again and we really should be talking AWACS.

COL MURPHY: I think the topic was opened up and the question will sustain.

GENE SYFERT: My name is Gene Syfert, 749 E. Bouse, Midwest City, Oklahoma 73110.

My question is concerning the aircraft traffic pattern altitude as they come in to approach Runway 17. What will the traffic pattern altitude be?

MAJOR DELUCA: The altitude they will be flying is the same as aircraft are flying at now the glideslope is 2 1/2 degrees, depending on where you live, the altitude will be different.

GENE SYFERT: Has the Air Force given any consideration in advertising in the radial facility charts to the pilots to maintain traffic pattern altitude until such time as they get to the normal approach pattern and will they do so with the E-3?

MAJOR DELUCA: Pilots are supposed to be following flight paths.

GENE SYFERT: I have one other comment, Air Force people that I have contacted out at Tinker have taken a negative approach to this because I have complained about the aircraft coming in at almost tree-top level. I can get the tail numbers off the planes.

UNIDENTIFIED PARTICIPANT: Right!

UNIDENTIFIED PARTICIPANT: We can hit them with a marshmallow.

GENE SYFERT: I think this is what the people here are mainly concerned with and the new aircraft coming in here.

MAYOR REED: You made the statements that the flights now are 3 degree on AWACS and has changed from 3 degree to 2 1/2.

MAJOR DELUCA: No Sir, the statement in the book says that it is presently being changed, that wasn't due to AWACS, that was due to the 105s.

MAYOR REED: In other words when the AWACS Book was written you had already changed the 3 to 2 1/2 percent.

MAJOR DELUCA: Yes Sir.

MAYOR REED: When?

MAJOR GIVENS: December 75.

MAYOR REED: For the simple reason of the 105s.

MAJOR GIVENS: Yes Sir.

MAYOR REED: Is this a requirement of approach landing, that you have to get down to that level.

MAJOR GIVENS: Yes Sir, this is for the safety of the 105. Three degree glideslope presented a power, reduced power situation which gave a high rate of descent to the aircraft. Difficult to break at the runway.

MAYOR REED: Then any other airplane in the Air Force inventory could come in at 3% except the 105s have to come in at 2 1/2%, is that what we are saying?

MAJOR GIVENS: The high performance fighter type aircraft is recommended to be at 2.5.

COL UNDERWOOD: (Ref Gene Syfert's question) - I believe you have a very valid question, and I would like to address it from the standpoint of the E-3A. I hope that you will understand that that's the airplane system that I will be associated with when and if it gets here. I heard the comment made that Air Force pilots have to fly by the rules. They are supposed to do just that, as commercial pilots are and I am not going to be capable, I don't believe of convincing each and everyone of you that if I tell you that it, in fact, will never have a pilot 50 feet or 100 feet off the assigned and appropriate altitude for a period of 10 or 20 years that the airplane is here and you believe me, I wouldn't blame you, but I will be the assistant Deputy Commander for Operations in the Wing. My boss and I will be responsible for the flying operations of the Wing. All air crews and all operational squadrons will work for us, and we work for the Wing Commander. You can accept it for what you accept me for, I guess, but I can guarantee that this airplane, not only for the cost of it, but for the safety of the 17 people on board in addition to those underneath will abide to the Air Force rules to the

best of the ability to those of us in the Wing to manage it. We intend to establish a flying safety program, a standarization and evaluation program that monitors and checks the qualifications of those people that we have in this Wing operation. I can only tell you folks tonight we are quite aways away from having an airplane that I as one, and I know the Wing Commander, and I know the Deputy Commander for Operations and it will be our goal to see that this does not happen with the E-3A. I will not stand here, however, and promise you that somebody will not be 100 feet off his altitude at some point in time in the future. I think your question is valid, and swear if it ever happens that one of these gets down to tree-top level, unless he is in an emergency situation, I would like very much to know about it.

SEVERAL UNIDENTIFIED PARTICIPANTS: What is your name? Let us have your name? Thank you Colonel.

UNIDENTIFIED PARTICIPANT: I don't think anyone here does not want to see this workload. It is very important to our community, the second point is that we are concerned how it will affect each and every-one of us individually. They indicated earlier in the meeting that the noise generated for this assignment, this workload, will not be any more than we experienced in the 443rd time frame. What we are most concerned about is the implied recommendation that HUD adopt this program and what impact, if they do have on each and everyone of us referring to the under-writing and the draw up and development of our community and this I think

I-13 is what or why that each and everyone of us investment in the community is not so much the workload of noise that we lived with in the past, but what impact it might have with the saving and loans or VA or HUD decides to exclude these identified areas and no longer support us with a loan. This is what is directly effect our investments in the community, not so much, we do want the workload. How many complaints have you had at Tinker because of noise?

MAJOR GIVENS: Since I have been at Tinker, we have a record of 4 in writing. I have received other phone calls which I have talked to people, I wouldn't want to say how many.

UNIDENTIFIED PARTICIPANT: We have indicated that we can somewhat tolerate the noise, the biggest thing that we are concerned about is the impact on the lending institutions that control the Government growth and development area.

JAMES NETTLETON: My name is James Nettleton, 821 Carroll Lane, Midwest City, Oklahoma 73110.

If these planes are as versatile as this film shows, why do you have to have so many flights in the air, day and night all the time.

MAJOR DELUCA: We have stated in the document that there will be very little night flying.

COL UNDERWOOD: The reason that we will have, and really we are talking about probably our training program is not exactly firm as to how many we will fly, but the reason they will be in the air here is because of training. And so the versatility that you see in the movie is to do with their actual employment in the mission wherever it might be, and we will have a training base here for all the crews that will fly these everywhere so repetition of the operations here is associated with pilot transition training, just as it was with the 141. Our night operations at the current time are planned to be at the moment, we are planning probably not more than one departure and arrival per night and I can't even guarantee that we will have that, there will be any more than that at all. Our training program is under development and we will be heavily oriented toward daytime operations. The same I believe is true with our engine run-up plans. The same way on the ground. So it is associated with the training function, Sir - not necessarily what you saw in terms of the mission capability.

DON RAPER: Col Underwood, why don't you explain the simulators?

COL UNDERWOOD: Yes, that might be an important point to you, part of this military construction program that was described earlier also, the 26 some million dollars, we are installing an on the ground simulator, both for the front end of the airplane and also for the back end members of the crew, and thereby utilizing those training facilities on the ground which simulate the airborne, the number of flights you see are significantly less than they would have been, had we not invested in the ground simulator capability. So every attempt has been made not just to reduce noise, but to save the cost of flying the airplane, burning the fuel will get the training on the ground. Incidentally, those facilities will be open for public inspection as soon as we get everything installed in them we will have an open house, provided we are allowed to locate here.

ARCHER COLBURN: My name is Archer Colburn, 616 General Senter, Midwest City, Oklahoma 73110.

Colonel earlier, you stated that there would be perhaps 8 flights out of Tinker each day, E-3A, and about 40 circles, are we assuming 5 circles per flight, or just what are we assuming? Are we assuming 7 or 4 touch and go or 5 touch and go or what?

MAJOR DELUCA: As the Colonel stated the complete training program is in the planning stages right now. The program as shown in the book is based on allotted flying hours that we know of now. We are basing that on 8 take offs and landings and 43 go-arounds. That is the maximum anticipated impact based on the point of aircraft being.

COL UNDERWOOD: In all fairness to you Sir (Colburn) your calculations are as correct as they can be at this time. We intend to take a sortie off and make use of about 4 or 5 approaches during that period, the rest of the time will be away from here in refueling or in other transition work at higher altitudes. So your calculations are quite right.

I-14 MRS. GENE SYFERT, JR: My name is Mrs. Gene Syfert, Jr., 4109 Bonapart Drive, Midwest City, Oklahoma 73110.

The main runway that you are using is it the North/South one where all these houses are affected? Could you not extend that runway the other direction, out towards Draper and therefore move the approach up enough that all these houses or less of the houses will be affected? Where they could land further out into Tinker?

MAJOR DELUCA: That land presently is not ours.

MRS. SYFERT: Well who owns the land out there?

MAJOR DELUCA: I believe it is Oklahoma City, I can't vouch for that.

COLONEL MURPHY: I think the question is a good one, unfortunately the hearing tonignt wasn't on that particular topic. We don't have the answer, but I will see that you get an answer. (Mr. John T. Bates, 205 Orchard Drive, Midwest City, Oklahoma 73110, asked the recorder for a copy of this same answer.)

MRS. SYFERT: Part of the reason why I asked is because we have just moved to a new home and my in-laws live on Bouse and using your chart where we live now on Bonapart is going to be like where they live on at Bouse, and so this very definitely has made a difference in where we live and - why they can't move the runway the other direction.

I-15 BILL LAWRENCE: My name is Bill Lawrence, 3012 Glenhaven Drive, Midwest City, Oklahoma 73110, a representative of the Midwest City/Del City Board of Realtors.

I am going to ask a simple question here, I think I can answer it myself, but I want it for a matter of record. What are you people at Tinker going to do for self preservation or self protection of your own people for the noise level and for the high accident risk, and the reason I am asking is so that we don't end up with extra requirements here for more insulation in our house, storm windows, and such as that.

COLONEL MURPHY: The question is, what are we going to do for the people who are now residing at Tinker AFB, in regard to these items.

MAJOR DELUCA: We do have items programmed, construction items presently in the program for additional insulation in the family housing areas, and for storm windows.

BILL LAWRENCE: How about for your people who work out there during the course of the day?

MAJOR DELUCA: The working areas, we do not consider as the incompatible areas, however, I can get a better answer for that for you later on.

BRIAN McALLISTER: My name is Brain McAllister, 704 E. Bouse, Midwest City, Oklahoma 73110.

What are the pre-requisites to changing the flight pattern? I am referring to this in respect to the fact - cause this is not to do with the program that you are trying to introduce now, as much as there is to find out what the pattern was at the time, or how it got changed for the 105s which now will be utilized by the new program which is no problem there, but was it compatible before these changes for the 105s to certain areas that it is now not compatible with.

MAJOR DELUCA: Are you talking about the glidescope that we were talking about previously? Are you talking about the 3 degree versus the 2 1/2 degree glidescope?

I-16 BRIAN McALLISTER: Well prior to the 105 and 105s added to your flight pattern, you said that you made a change on the flight pattern for the 105s. If you did, prior to this was the Steed area and certain areas that are not compatible now, were they compatible then?

MAJOR DELUCA: No Sir. Maybe, I haven't made myself clear - the accident zones which makes Steed incompatible are for every Air
I-17 Base throughout the United States, 260 of them I believe, the study shows. This data was compiled from accidents over the past, I believe it went back as far as 1968. All the Air Force is saying is that these accident zones exist at each Air Force base, it is not based on the flight patterns, the glidescope or the number of flights. They are just saying that these are the highest accident potentials in an Air Force installation, and that is why Steed School is incompatible. Not because of the flight track, glidescope, or the number of flights - just based on the area that it is located straight off the runway in one of the accident area.

I-18 UNIDENTIFIED PARTICIPANT: Would you give those percentages again.

MAJOR DELUCA: Yes. I believe it is 40%.

DEAN HOLT: I believe the clear zone is approximately 39 or 40%. Accident potential zone one which is next to the clear zone is in the neighborhood of 17% and the zone furtherest out is approximately 8%.

UNIDENTIFIED PARTICIPANT: That is where Steed School is.

DEAN HOLT: Steed School is in accident zone two.

HAROLD HUNTER: Will you please explain the chart please. I think that will clear a bunch of this up, compared to our present situation and what it will be.

MAJOR DELUCA: I will give you a short briefing on the chart and then everyone can come and take a look at it during the break. You will see on each one of these charts the present condition and the AWACS condition. There are three rectangular areas at the end of each runway. These are the accident potential zones. The clear zone would be 40% - right at the end of the runway. The next zone is a separate one from the last zone and is located here. Those percentages that he gave: 40, 17, and 8, go with these three rectangles at each end of the runway. These contours are based mainly on the annoyance level and the noise in the contours rather than the actual --

UNIDENTIFIED PARTICIPANT: Steed School is located in the accident, 8% accident zone and it hasn't changed, it has been that way ever since it was built.

UNIDENTIFIED PARTICIPANT: Impact AWACS - how?

MAJOR DELUCA: The impact is based on noise, no matter how many airplanes we bring in here, the accident potential zones stay the same.

UNIDENTIFIED PARTICIPANT: I noticed the zone has been extended north approximately one mile - almost.

MAJOR DELUCA: Maybe these aren't lined up exactly correct, but it has not been extended north.

COLONEL MURPHY: The charts appear to be different - but it has not been extended.

Are there any more questions? If not, after a short recess, I will call at random from the list of registration cards those persons who indicated a desire to make a statement. Anyone who has not completed a registration card who wishes to make a statement should complete a card at this time. It is now 9:10 and at this time we will recess until 9:20.

(At this time there was a 10 minute recess)

It is now 9:20 and we are ready to resume the meeting at this time and those of you who wish to make statements will be called upon to do so now.

S T A T E M E N T S

MAYOR REED: I would like to clear the air on one thing, as Mayor of your city I endorse the AWACS project. I oppose this. This is what I am opposed to is AICUZ Concept - the mission that you are proposing to bring in here, I think will be a great asset to our community. I think it will be a great asset to our nation with our Air force as our strength, and God help that our nation continue that strong. I will tell you this, our City Council, we will oppose this, we will continue to oppose this, we
I-19 will work with HUD which we are working with at this time. HUD does not accept this concept at this time, HUD has agreed with us and they will furnish us instruments that we can start taking our own noise level. So let me assure you that your City Council will be working on this concept, but I cannot speak for the total Council, I haven't asked them, but I believe they will all endorse the AWACS Program.

HAROLD HUNTER: I think I may have agitated the Major, and the Colonel here too a little bit while ago, however, I want to make it clear. I want to reflect again Mayor Reed's statement of a while ago. I am definitely not against AWACS. I am not against Tinker. What I am against is this Aircraft Compatibility Use Zone (AICUZ) they call it. Now the impact that this will have on us, I am sure that a few of us have lived under this noise for quite sometime. It hasn't been too great, at times they get a little low, like I say come over and look at the tree-tops in some of the parks over there, where those afterburners have turned them brown - they get a little low every once in a while, however, this is our life, this is our city. I don't work at Tinker Field. I don't depend on Tinker for a living. I work in Oklahoma City. I live in Midwest City, because I like the Midwest City area. Now this will be a great benefit to us, in this area, and I want to clear the air on that too that I am not against the Air Force, I spent 11 years in that blue uniform myself, so how could I be against
I-20 it. Now if any of you feel, what we want to do is fight this Aircraft Compatible Use Zone. Now if they get a hold of this thing, they are going to stop the Insurance Companies from giving us Insurance on our homes. That will devaluate our property because we will no longer be able to sell it because we can't get any Insurance on it. FHA and VA will not make a loan on it because you can't get Insurance. So what we want to do we want to fight this AICUZ outfit instead of AWACS. Thank you very much.

DICK HOFFMAN: Sir, I would like to ask Harold Hunter where he got the information that he couldn't get Insurance on one of those houses. I am serious, that is the question. I would like to know. I am a builder out here and I would really like to know.

HAROLD HUNTER: State Realty Board, check with them.

DICK HOFFMAN: I built some houses four years ago out here on Northeast 34th and Spencer Road that came under this situation.

HAROLD HUNTER: Excuse me, you misunderstood me. I said that if this goes through.

DICK HOFFMAN: Well this thing has been through 4 or 5 years ago.

UNIDENTIFIED PARTICIPANT: We don't want to happen what happened to Glenwood, that's all.

DICK HOFFMAN: Well no one said that it was going to happen, the only requirement that HUD made to us in the development of a new area, in a new addition, they made us put in 6 inches of insulation which is now a HUD requirement. They made us put on storm doors and storm windows and they made us put on a solid exterior front door. Now I know everybody says, where are we going to get the money for storm windows. If you have been listening to OG&E and Oklahoma Natural Gas telling you what you ought to do to cut down your fuel bills, you ought to have storm windows on your house anyway. If you don't have 6 inches in your ceiling, you should have it anyway, and the existing house that you have whether it has a solid front door or a hollow core door will not make any difference. Now we went through this thing 4 years ago, it ran the cost of our houses up about $300.00 and that was the total cost, we are in that zone of this noise factor.

HAROLD HUNTER: That was about four years ago, it is about three times that now.

UNIDENTIFIED PARTICIPANT: Was that under AICUZ, Sir, or are you talking about something else?

UNIDENTIFIED PARTICIPANT: I am talking about AICUZ.

UNIDENTIFIED PARTICIPANT: Our spokesman said a moment ago AICUZ hadn't been approved.

COL REYNOLDS: At that time Sir, I believe it was called a Green Belt Zone, which was a similar type.

E.B. MILLER: I think that we have kinda mixed up our apples and oranges a little bit tonight and I think this is the time that we need to clarify them a little bit. Right off hand, I would say that we are extremely fortunate that this AWACS organization was proposed at Tinker. It didn't happen by accident. It happened by a design and through the efforts of a lot of people. I think that we are lucky that Tinker was selected for this organization. We are going to lose some military and some civilians at Tinker. We have been losing them now for about the last four or five years. When I came here 12 years

ago, the base population at Tinker was 25,000. When I was at Tinker we had over 30 airplanes that were assigned to the base and now there are no airplanes whatsoever, and your base population now is about 5,000 to 7,000 less than what it was at that time. So I think for that reason we are getting an orgainzation in here we ought to be very thankful that we have this type of organization. The aircraft that they are bringing in here are much quieter than the normal traffic at Tinker, and I think this is something to be thankful for. Now there are other airplanes that they could have sent here that perhaps would be a lot noiser. So this will take up some of the slack in the community. It will help us from the point of view of our local economy. As I pointed out earlier the noise factor of this organization, when it is in full operation will be considerably less than what we have experienced in the past. The Air Traffic will be less than we have had in the past. So really from an environmental point of view, I think we are fortunate, that we have had this type of unit to come here to Tinker Air Force Base. I would like to clarify that point, that I think this is really a great blessing and we ought to give it a 100% support from everyone in our community, not only Midwest City, but Del City, Oklahoma City, Oklahoma County, and the surrounding areas. I think we ought to give the Air Force a great vote of thanks for us being this fortunate. The main issue as I see it tonight is the fact that there would be some Government agencies that could and probably will, if the past record will indicate the actions in the future, is that something of this nature will be adopted by other Governmental Agencies which will provide something that would be unbearable and intolerable in our community. It has already been covered previously, but I would say this, that I think we need to be on our toes, we need to have a group to take this under advisement, as the Mayor has suggested, and I would also say that we ought work together with the United States Air Force in endeavoring to straighten out the issue that will be to the advantage of both the Air Force and to our local community. We need to take action on that phase of it, we need to take action to get the AWACS here, and I hope that all of you will do all you can to help our community in both regards.

COL MURPHY: This concludes the list of those who asked to be heard on a prepared statement.

Then at this time I would like to thank Major DeLuca and his assistants for their excellent presentation and assistance in responding to your concerns. I would also like to thank those Public Officials who are present, but most of all, I would like to thank those of you who may rightly be called the general public. Your interest and participation in this proceeding is especially gratifying. In this republican form of Government, we are often content to permit our elected officials to represent our interests and they are here tonight doing an admirable job. However, those of you who are concerned and who have sacrificed your valuable time and efforts to enhance the quality of this proceeding must be commended.

The Department of the Air Force is truly interested in accomplishing the AWACS Beddown in a manner not only beneficial to the Government, but to this community as well. Your participation here tonight will assist immensely in discharging this somber responsibility.

Again, let me remind you that I will not be making any recommendations or decisions regarding the AWACS Beddown. My function has been to conduct an orderly hearing and to insure that your views are made available to those in the Department of the Air Force who will be making recommendations and decisions regarding the AWACS Beddown.

Finally, before adjourning, remember the closing date for including any other comments concerning the AWACS Beddown in this record is 1 June 1976 and should be addressed to me: Colonel John T. Murphy, OC-ALC/JA, Tinker AFB OK 73145.

There being no other business, I declare this proceeding adjourned.

RESPONSE TO

QUESTIONS POSED

AT 25 MAY 1976

PUBLIC HEARING

I-1 Response to Unidentified Participant, Page I-15:

L_{DN} 65 was selected by the Air Force, with the agreement of the Environmental Protection Agency, as the outer boundary of the noise analysis area on the basis of many aircraft noise studies conducted in this country and others around the world. Most experts agree that noise levels below L_{DN} 65 do not pose significant problems.

I-2 Response to Unidentified Participant, Page I-15:

See response to I-1 above for clarification.

I-3 Response to Mrs Ray Porter, Page I-16:

Steed School is shown as incompatible because it is in Compatible Use District 9 (Accident Potential Zone I and L_{DN} 75-80). There is identifiable risk of aircraft accident and relatively high noise levels in this area. Although it is identified as incompatible, the Air Force has not recommended that anything be done with regard to Steed School. Any actions are solely the responsibility and at the direction of local authorities.

I-4 Response to Mr Phillips, Page I-19:

The AICUZ concept was presented to the ACOG Board of Directors at their meeting of 19 January 1976. This presentation was listed on the agenda for the meeting and an article was printed in the newspaper inviting the public to attend. The mayors and planning staffs of the local communities were in attendance.

I-5 Response to Ms Kirk, Page I-19:

With the exception of land within the expanded clear zone, the AICUZ is not directed toward existing land uses. The intent of AICUZ is to achieve future compatibility in undeveloped areas.

I-6 & I-7 Clarification of Major DeLuca's Comments, Page I-20:

The following attached excerpt from the Tinker AICUZ Study should clarify the comments.

APPENDIX C

ACCIDENT POTENTIAL STUDY

One of the most important milestones of accident hazard analysis took place in 1952 with the publication of The Airport and Its Neighbors. This report of the President's Airport Commission, better known as the Doolittle Report, has several significant recommendations on the subject of airport hazard.

"4. Incorporate cleared runway extension areas into airports. The dominant runways of new airport projects should be protected by cleared extensions at each end and at least one-half mile in length and 1000 feet wide. This area should be completely free from housing or any other form of obstruction. Such extensions should be considered an integral part of the airport."

"5. Establish effective zoning laws. A fan-shaped zone, beyond the half-mile cleared extension described in recommendation 4, at least two miles long and 6000 feet wide at its outer limits should be established at new airports by zoning law, air easement or land purchase at each end of dominant runways. In this area, the height of buildings and also the use of land should be controlled to eliminate the erection of places of public assembly, churches, hospitals, schools, etc., and to restrict residences to the more distant locations within the zone."

These recommendations were based on the knowledge that accident risk was greater in these areas than others. It was an attempt to define a relative, acceptable risk. The Doolittle Report criteria served as the general basis for the original Air Force Greenbelt and AICUZ concepts of 1971 and 1972, although the lines were somewhat different from those of FAA and Air Force criteria. Fan-shaped approach-departure zones were used to a point 2 1/2 miles from the threshold and divided into two parts: the first 2500 feet was Zone 1 and the remainder was Zone 2.

The use of these fan-shaped zones posed a fundamental problem. It became apparent when Air Force past accidents were plotted. The occurrence of accidents simply did not fall neatly within the zones. The approach-departure zones excluded some accident intensive areas while they included some areas with little or no risk.

In mid-1973, the Air Force performed an Air Force-wide accident hazard study. Its purpose was to identify land areas near airports with significant aircraft accident potential. The study covered the period 1968 through 1972 and involved the review of reports on 369 major accidents that occurred within a ten nautical mile radius of airfields and were directly related to airfield associated in-flight mishaps.

The analysis revealed the following basic findings:

1. Accident potential increases significantly near the extended runway centerline.

2. Seventy-five percent of the accidents plotted were near the extended runway centerline.

3. Fighter and training type aircraft account for over 80% of all major USAF accidents.

4. Of the 369 accidents plotted, 84 (22.8%) occurred on or adjacent to the runway (an area 2000 feet wide from threshold to threshold).

5. Nearly 61% of the accidents occurred during the landing phase as compared to 39% for the takeoff phase.

6. Almost 70% of the accidents occurred during daylight hours.

7. Seventy-five percent of the accidents resulted in definable debris impact areas. The impact areas varied in size for each type of aircraft as well as the phase of flight during which the accident occurred. By using weighted averages for impact areas resulting from approach and departure accidents and grouping these by class of aircraft, it was determined that the average impact area per accident was 5.06 acres. Figures varied from 2.73 acres for trainer and miscellaneous aircraft to 8.73 acres for the heavy bombers of the transport/tanker/bomber class.

ACCIDENT POTENTIAL ANALYSIS

As previously stated, the purpose of the Air Force-wide study was to define accident potential zones based on the locations of past accidents. The methodology employed the plotting of accidents for all aircraft by four classes: (1) fighter, (2) trainer/miscellaneous, (3) tanker/transport, and (4) bomber. These classes were selected because of aircraft size, speed, operational characteristics and procedures.

Because accidents cluster somewhat along the extended runway centerline, a tabulation was prepared to describe the cumulative frequency of accidents as a function of distance from the runway threshold along the extended runway centerline for widths of 2000, 3000 and 4000 feet.

The objective was to identify significant patterns of accident occurrence related to area. In other words, the result must show the maximum percentage concentration of accidents in the smallest area. Figure C-1 depicts the cumulative percentage of accidents

for all four aircraft types as a function of length and width of the area along the extended runway centerline. This indicates that the optimum width to include the maximum percentage of accidents in the smallest area is 3000 feet. Looking at distance from the threshold, curves rise very rapidly the first 3000 feet, round out more gradually from 3000 to 8000 feet and then rise more gradually from 8000 to 15000 feet where they level off with very little slope. In other words, a zone extending beyond 15000 feet does not include significant additional accidents and the curves below this point appear to be well represented by three zones.

Optimum zones were then determined by minimizing the area necessary to include significant percentages of accidents. Zone lengths of 3000, 8000 and 15000 feet were used because they correspond to the break points of the curves in Figure C-1. These zones and their respective accident percentages are shown in Figure C-2.

Separate analyses were conducted to determine the validity of the zones for each of the four classes of aircraft. A chi-square analysis indicated that accident occurrence variation from one zone to another was within the acceptable range with the exception of fighter and trainer aircraft in the 3000X 3000 feet clear zone which should be only 2000 feet wide for these aircraft.

BASIC LAND USE COMPATIBILITY

There are two primary considerations in defining statistically valid zones: (1) the relationship of accident occurrence to land area, and (2) the relationship of a single crash to the area impacted.

At the outset of the above referenced analysis, it was determined that the difficulties associated with producing statistically valid probabilities precluded their use. The variables are so numerous and difficult to apply to a given installation that almost any result would be subject to much discussion and controversy. However, this does not preclude the development of planning criteria based upon the employment of descriptive statistics.

Therefore, it was decided to express accident occurrence in terms of the relationships between impact points and the areas of the accident zones. Figure C-3 describes these relationships. Because the objective is to produce a relative index by which land use decisions can be made, a simple procedure is paramount. The result is accident occurrence versus area scale. It is first necessary to record basic area and accident data (columns 1-5). Then the ratio of percent of total accidents to percent of total area is computed (column 6).

In each case the ratio of percent total accidents to percent total area is highest for the Clear Zone. Thus, a Hazard Index (HI) of 100 is assigned to the Clear Zone. Using column 6 for the Clear Zone as the base, the Hazard Index can then be expressed as the ratio of column 6 for each area to that of the Clear Zone. There exists an established land use standard for areas adjacent to runways - that of no buildings, structures or habitation except those to directly support flying operations. Therefore, the range between this HI and 100 determines the area for this standard.

Using Figure C-3 as an example, the Clear Zone is described by HI of 100 (Column 7). The HI for the area adjacent to the runway is 50 (138/278). The HIs for Zones 1 and 2 are 12 and 5 respectively.

The HIs drop appreciably for Zones 2 and 3. The HI for the remaining area within the airport environs is inconsequential. It is, therefore, impractical to suggest any land use control on the basis of accident hazard outside these three zones.

DISTRIBUTION OF AIR FORCE AIRCRAFT ACCIDENTS
(Within 10 NM of a Base)

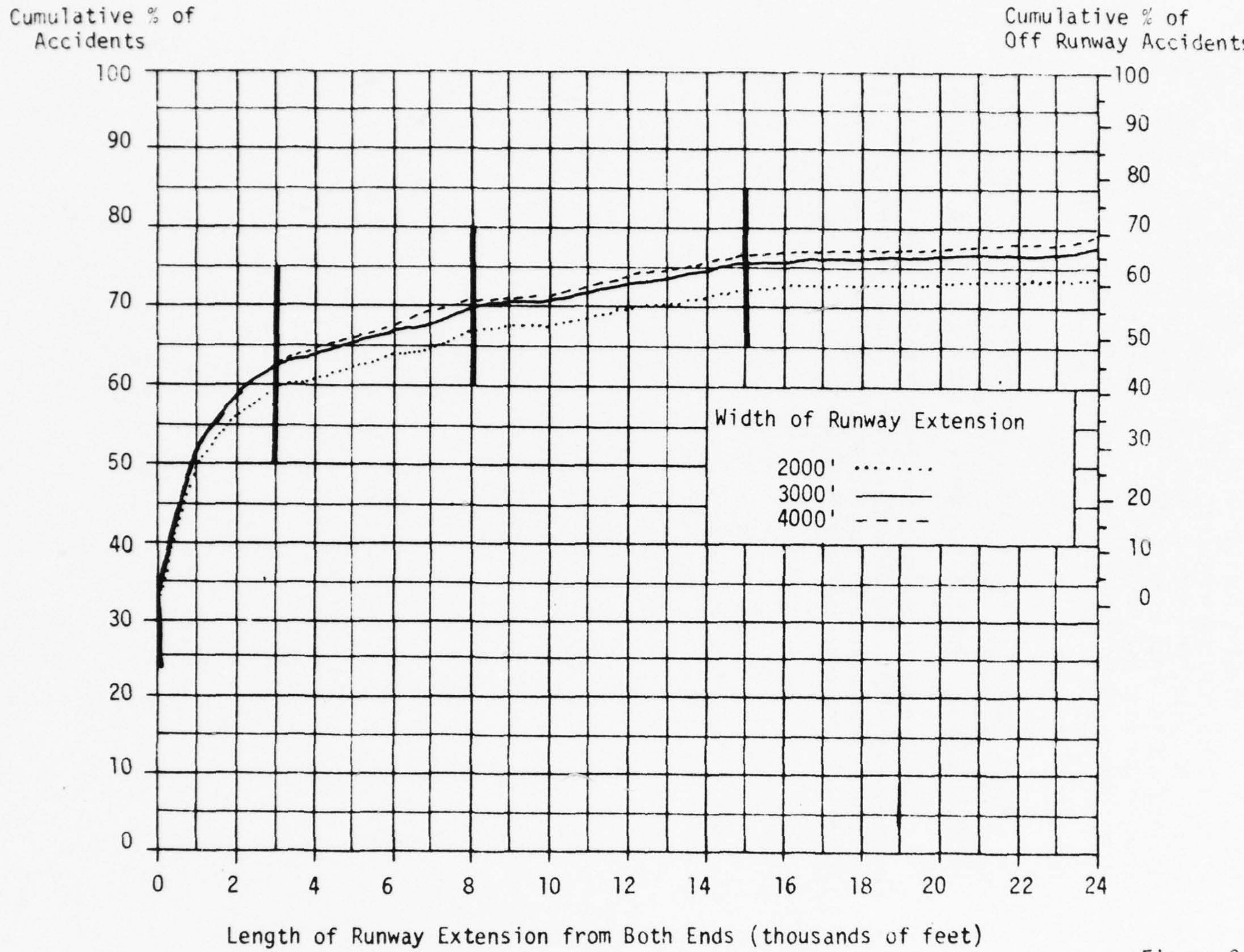

Figure C-1

AIR FORCE ACCIDENT DATA

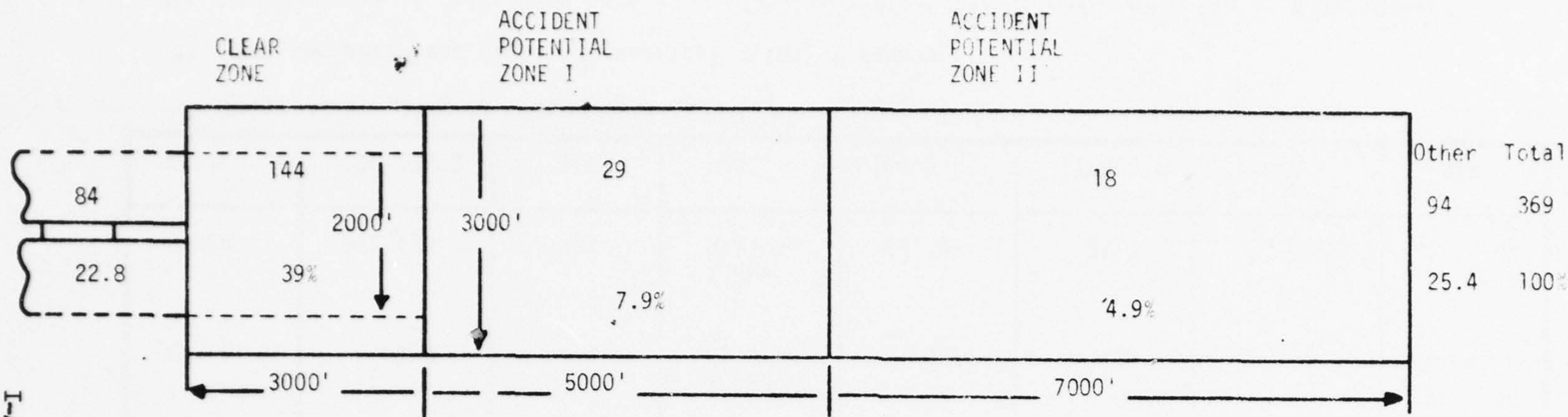

Figure C-2

ACCIDENT HAZARD ANALYSIS *							
LOCATION	1/ AREA ** (ACRES)	2/ NUMBER OF ACCIDENTS	3/ ACCIDENTS PER ACRE	4/ PERCENT TOTAL AREA	5/ PERCENT TOTAL ACCIDENTS	6/ RATIO OF % ACCIDENTS TO % AREA	7/ HAZARD INDEX ***
RUNWAY	487	84	1 Per 5.8 AC	.165	22.8	138	50
CLEAR ZONE	413.5	144	1 Per 2.87 AC	.140	39	278	100
APZ I	688.5	29	1 Per 23.7 AC	.233	7.9	34	12
APZ II	964.2	18	1 Per 53.6 AC	.327	4.9	15	5
OTHER	292,483	94	1 Per 3111 AC	99.133	25.4	0.26	.09
TOTAL	295,036.2	369	N/A	100.0	100.0	N/A	N/A

* Prepared by using Air Force Data (See Figure C-1)

** Area includes land within 10 nautical miles of runway

*** Hazard Index is calculated by (1) dividing each figure in Column 6 by ratio of % accidents/ % area for Clear Zone and (2) multiplying that number by 100.

FIGURE C-3

I-8 Response to Frances Coffin, Page I-21:

Under the Expanded Clear Zone Program, condemnation is possible and could be used if the United States Government and the land owners are unable to agree. The clear zone extends 3000 feet from the end of the runway.

I-9 Response to Mayor Reed, Page I-23:

The noise will increase due to increased air operations.

I-10 Response to Mayor Reed, Page I-23:

Ninety-two bases are affected.

I-11 Response to Neal Tinsley, Page I-24:

Although noise will not be measured at Tinker, a measurement verification program is underway at several other installations.

I-12 Response to Neal Tinsley, Page I-25:

The following is quoted from the Tinker AFB AICUZ Study, "Land-use planning and control is a dynamic rather than a "static" process. The specific characteristics of land-use determinants will always reflect, to some degree, the changing conditions of the economic, social and physical environment of a community as well as changing public concern. The planning process accommodates this fluidity in that decisions are normally not based on rigid boundary lines but rather on more generalized area designations.

AICUZ boundaries/noise contours describe the impact of a specific operational environment and as such will change if a significant change is made operationally. If the local community attempts to use AICUZ boundaries as the boundary lines of zoning districts it is conceivable that problems will result. Such an attempt to solidify noise contour lines is not consistent with the above characteristics of planning. Additionally, the Air Force is recommending that AICUZ data be utilized with all other planning data. Specific land-use control decisions will not, therefore, be based solely on AICUZ boundaries. The Air Force cannot guarantee that AICUZ boundaries (noise contours) will never change. It is reasonable to assume that any significant operational change (which would substantially modify the contours), would be subject to the Environmental Impact Statement requirement and thus be part of the continuing planning process."

I-13 Response to Unidentified Participant, Page I-27:

The Air Force has recommended that HUD and VA use the AICUZ maps and guidelines in the application of its programs. This is consistent with HUD and VA national policy.

I-14 Response to Mrs Gene Syfert, Jr, Page I-29:

In order to move the runway south enough to not affect any houses in Midwest City, you would have to move approximately seven thousand feet. This distance would require crossing Interstate 240 and entering a portion of Lake Stanley Draper where it is in a full condition. Crossing the highway and extending into the lake makes the cost too exorbitant to estimate. A maximum of 2000 feet is all that can really be considered for this question. Due to the southward sloping terrain in this area, a tremendous amount of fill would be required. The estimated cost is $25 million and a significant portion of Midwest City homes would still be in the accident zones. The incomplete results would not justify the cost expenditure.

I-15 Response to Mr Bill Lawrence, Page I-29:

Headquarters USAF requires all bases to comply with more restrictive criteria for land use planning, with respect to noise, than has been recommended to the local communities in the Air Installation Compatible Use Zone (AICUZ) Program. Where existing development and/or limited base real estate necessitates the construction of new facilities in an "incompatible area" a waiver is required to permit construction. Although a waiver may be approved for a specific location, design to include a noise level reduction (NLR) of 40 db is required for high noise areas and a 15 db NLR for other areas. Certain existing facilities are being upgraded to include additional insulation and storm windows. This is being done not only for sound attenuation, but for energy conservation and is not being done on all facilities.

I-16 Response to Mr Brian McAllister, Page I-30:

Further discussion with Mr McAllister indicates that his question referred to recent increases in traffic over his home. This was due to construction on the main north/south runway requiring full time use of the crosswind runway. This situation made it seem that flight path changes had been made. Construction was completed in late May 1976 and traffic patterns are now back to normal.

I-17 Clarification, Page I-30:

Ninety-two bases.

I-18 Response to Unidentified Participant, Page I-30:

See response I-6 and I-7 above.

I-19 Response to Mayor Reed, Page I-32:

See response I-13.

I-20 Response to Mr Harold Hunter, Page I-32:

This statement is only true with regard to new development.

APPENDIX J

LETTER FROM DEPARTMENT OF TRANSPORTATION

FEDERAL AVIATION ADMINISTRATION

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

SOUTHWEST REGION
P. O. BOX 1689
FORT WORTH, TEXAS 76101

J[illegible] 1 0 1976

Dr. Billy Welch
Special Assistant for Environmental Quality
SAF/ILE
Washington, D.C. 20330

Dear Dr. Welch:

The copy of the Draft Environmental Impact Statement (DEIS) on the AWACS Beddown at Tinker AFB, Oklahoma, has been reviewed and we offer the following comments for your consideration:

The proposed action does not appear to have any effect on known civil airport operations. The primary impact of the AWACS Beddown is related to aircraft operations and the military construction program.

The increase in takeoffs, landings, and practice instrument approaches addressed in the DEIS can be absorbed by the increase in facility staffing forecast through 1981 with minor impact to the approach control operation.

Based on the assumption that Tinker AFB will be included in the Terminal Radar Service Area and Stage III radar services initiated prior to 1981, significant impact will be realized from the increased number of VFR local operations (closed traffic) generated by AWACS traffic due to the coordination and sequencing involved. During previous discussion with Air Force authorities as to the feasibility of implementing Stage III radar services at Tinker AFB, the additional staffing and equipment that would be necessary to provide this service were identified and covered at length. The increased operations due to AWACS further reinforce these requirements.

Thank you for the opportunity to review this DEIS.

Sincerely,

Henry L. Newman

Director

RESPONSE TO

DEPARTMENT OF TRANSPORTATION

FEDERAL AVIATION ADMINISTRATION

SOUTHWEST REGION

(LETTER 10 JUN 1976)

No comment required.

APPENDIX K

LETTER FROM ASSOCIATION OF

CENTRAL OKLAHOMA GOVERNMENTS

ASSOCIATION OF CENTRAL OKLAHOMA GOVERNMENTS
Suite 200, 4801 Classen Boulevard, (405) 848-8961, Oklahoma City, Oklahoma 73118

① DCS/P&R
Asst
② Action PRE
Susp
Info
(plum)

June 18, 1976

Dr. Billy Welch
Department of the Air Force
Office of the Assistant Secretary
SAF/ILE
Washington, D.C. 20330

RE: ACOG# EIS 5-76-01 for AWACS Beddown at Tinker AFB, Oklahoma

Dear Dr. Welch:

In conformance with the Office of Management and Budget Circular A-95, the environmental impact statement on the above referenced project has been reviewed by the appropriate local governments and the nature of those comments received indicate no local conflict.

Enclosed find copies of letters and resolutions prepared and adopted by individual cities and the Tinker Area Impact Committee and concurred in by the ACOG Board of Directors regarding this area's official support of the proposed AWACS Beddown at Tinker AFB, Oklahoma.

The ACOG Board of Directors concurrence is intended to reinforce the Tinker Area Impact Committee's support of the AWACS Beddown and to express a continued intent on the part of the communities of this area to cooperate with the U.S. Air Force at Tinker in providing suitable living environment.

Sincerely,

Larry Goodman

Larry E. Goodman
Executive Director

LEG/lr

Encl: 4

cc: Col. R. M. Engelbeck, Base Commander, Tinker AFB
Oklahoma Congressional Delegation

AN OFFICIAL STATEMENT OF POLICY BY THE
TINKER AREA IMPACT COMMITTEE
EXPRESSING SUPPORT FOR THE BEDDOWN OF PROPOSED
AIRBORNE WARNING AIRCRAFT CONTROL SYSTEM
AT TINKER AIR FORCE BASE

The Tinker Area Impact Committee has reviewed the "Draft Environmental Statement for Airborne Warning Aircraft Control System (AWACS) Beddown at Tinker Air Force Base, Oklahoma" and has elected to express support for the proposed AWACS mission at Tinker with the policy considerations for basis of official support being as follows:

1. The Tinker Area Impact Committee has reviewed the Draft Environmental Statement for the AWACS Beddown at Tinker Air Force Base, and
2. The Tinker Area Impact Committee has received notification thereby that a new mission designated AWACS has been proposed for Tinker Air Force Base, and
3. It is recognized that Tinker Air Force Base is a mainstay in the economic base for Central Oklahoma, and
4. The proposed AWACS mission will have a positive impact upon the local economy by causing the employment level at Tinker to increase by 750 jobs, and
5. Without the proposed AWACS mission at Tinker, the employment level would be reduced by an estimated 2,462 jobs, and
6. It is recognized that a positive economic impact upon the local economy will be caused by the $26.7 million input into Tinker for alteration of existing facilities and new construction to support AWACS, and
7. It has been determined in the Draft Environmental Statement that the principle adverse impact of the AWACS will be aircraft noise, and to a lesser extent accident hazard potential and air pollution, and
8. The impact of aircraft noise upon member cities of the Tinker Area Impact Committee is by the Air Installation Compatible Use Zone (AICUZ) being a study prepared by the Air Force without local consultation, advice, and input - - an untested and unproven study containing recommended guidelines which could have a negative and adverse impact upon the local community, and

9. A member City of the Tinker Area Impact Committee has officially consulted with the Oklahoma Congressional Delegation and David O. Meeker, Assistant Secretary for Community Development, Department of Housing and Urban Development (HUD), during the time period of March 15 through 17, 1976, in Washington, D. C. and been advised that the recommended guidelines in AICUZ would not be implemented without further consultation, study, refinement, and local input, and

10. The local HUD office concurs with the posture of no implementation of the recommended AICUZ guidelines in accordance with the HUD Central Office in Washington, D. C., and

11. The Draft Environmental Statement has identified AICUZ as one of the "Unresolved Matters" concerning both the present and proposed mission of Tinker Air Force Base as the AICUZ relates to assessment of noise impact and Air Force Land Use recommendations, and

12. It has been determined that the accident hazard potential of Tinker aircraft operations related to Midwest City in the Clear Zone (to be owned in fee simple title by the U. S. Government) is 39%, in Accident Potential Zone I (the majority of which is being cleared by the Airport Clearance Project via the Oklahoma County Commissioners) is 7.9%, and in Accident Potential Zone II is 4.9%, and

13. The Draft Environmental Statement has determined that air pollutant emissions in the 1981 timeframe resulting from AWACS will be equivalent to approximately 0.5 percent or less of the regional emissions reported for 1970, and

14. The Cities which comprise the Tinker Area Impact Committee have consistently acted in a manner indicating community support for the U. S. Air Force mission at Tinker Air Force Base and the objectives of national defense and security for which Tinker stands.

The above considerations were addressed by the Tinker Area Impact Committee at their meeting of June 11, 1976, and official support for the proposed Beddown of AWACS at Tinker Air Force Base is affirmed as follows:

1. The Tinker Area Impact Committee, with a view toward the national security, expresses support for the Beddown of AWACS at Tinker Air Force Base as discussed above and as presented in the Draft Environmental Statement.

2. The Tinker Area Impact Committee expresses a continued intent to cooperate in the best interest of the members of this committee with the U. S. Air Force at Tinker to provide a suitable living environment within the corporate limits of cities which comprise this committee while providing for the protection and integrity of all necessary operations at Tinker Air Force Base.

3. The Tinker Area Impact Committee recognizes and includes with this statement of recommended support the following relevant materials:

   a. A letter dated May 24, 1976 from Patience Latting, Mayor of Oklahoma City, to Odell Morgan, Association of Central Oklahoma Governments, expressing the official support of the City of Oklahoma City for AWACS and other concerns as noted (see attached letter).

   b. A statement of official policy support of the AWACS program and expressing concerns as adopted about the AICUZ on May 25, 1976 by the City Council of the City of Midwest City, Oklahoma.

CITY of OKLAHOMA CITY OKLAHOMA CITY, 73102

MUNICIPAL BUILDING 200 NORTH WALKER

May 24, 1976

Mayor

PATIENCE LATTING

Mr. Odell Morgan
Intergovernmental Programs Coordinator
Association of Central Oklahoma Governments
4801 Classen Boulevard, Suite 200
Oklahoma City, Oklahoma 73118

Dear Mr. Morgan:

This letter is to convey the City of Oklahoma City's comments regarding the Draft Environmental Statement: AWACS Beddown at Tinker AFB, Oklahoma.

The Community Development staff of the City of Oklahoma City has reviewed the draft Environmental Statement and would comment in only one area. Care will be required in location of the proposed family housing units as shown on Figure 4.6.2.-A, Crutcho Creek Drainage Basin, p. 183 of the draft statement.

As indicated in the Environmental Statement, the Air Force is aware of the fact that Crutcho Creek has experienced considerable flooding. The Air Force is also aware of the fact that, although the proposed development will increase peak discharges into the Crutcho Creek Basin, the increase caused by this particular development will not have a significant effect on flooding conditions.

The Community Development engineering staff is concerned with the possible cumulative effects of development in the area. The Air Force should be notified that the areas in Oklahoma City west and south of the proposed site are zoned for development and that several industries have proposed locations in the area. Increased runoff from projected urbanization upstream from the proposed housing units should be considered by the Air Force in establishing the elevation of the building pads.

We welcome the addition of the AWACS to Tinker AFB and look forward to continued cooperation with the Air Force regarding matters of mutual concern.

Sincerely,

Patience Latting

Patience Latting
Mayor

"PEOPLE Are Our Business"

The City of Midwest City

P.O. BOX 10570 • MIDWEST CITY, OKLA. 73110 • (405) 732-2281

Mayor
MARION C. REED
Vice-Mayor
CLAUDE R. RIGSBY
Council Members
CLAUDE R. RIGSBY
BOB MATTHEWS
JAMES E. HULSEY, JR.
DOROTHY JO ZACHRY
MARVIN D. ALMON
LYNN J. FRY
City Manager
JERRY D. WADE

June 11, 1976

Department of the Air Force
Office of the Assistant Secretary
SAF/ILE (Billy E. Welch, Ph.D)
Washington, D. C. 20330

Attention: Billy E. Welch, Ph.D
Special Assistant for Environmental Quality

Re: Transmittal of "An Official Statement of Policy by the City Council of Midwest City, Oklahoma, expressing support for the Beddown of Proposed Airborne Warning Aircraft Control System at Tinker Air Force Base."

Dear Dr. Welch:

Please find attached the above referenced policy statement which was unanimously adopted by the City Council at their regular meeting of June 8, 1976. I am pleased to convey to you the official support of this City Council for the proposed AWACS mission at Tinker Air Force Base.

Please also consider an official request for a complete transcription of the minutes of the public hearing which was held on AWACS at the Midwest City Community Center at 7:00 p.m. on May 25, 1976. I believe that the official support of the City Council is firmly based upon the public support for AWACS which was expressed by numerous area residents who spoke at the hearing. A record of this meeting will be most useful to the City - - a review and reflection upon that record should also serve as evidence to you that the reservations which this City Council has about the Air Installation Compatible Use Zone Study are shared by the residents of this community.

If I can be of further assistance to you in this matter, please do not hesitate to call or write.

Yours truly,

Marion C. Reed
Mayor

cc: Oklahoma Congressional Delegation
Tinker Air Force Base Commander
Tinker Air Force Base Civil Engineer
Governor David Boren
Oklahoma State Senators and Representatives
David Meeker/HUD
Robert Breeden/HUD
Jerry D. Wade, City Manager
David C. Miller, Assistant City Manager
Irving P. Frank, Director, Community Development and Planning
John T. Bates, City Engineer
Ned K. Burleson, Environmental Protection Agency
Larry Goodman, Association of Central Oklahoma Governments

AN OFFICIAL STATEMENT OF POLICY BY THE CITY COUNCIL OF THE CITY OF MIDWEST CITY, OKLAHOMA, EXPRESSING SUPPORT FOR THE BEDDOWN OF PROPOSED AIRBORNE WARNING AIRCRAFT CONTROL SYSTEM AT TINKER AIR FORCE BASE

The City Council of Midwest City, Oklahoma, has reviewed the "Draft Environmental Statement for Airborne Warning Aircraft Control System (AWACS) Beddown at Tinker Air Force Base, Oklahoma" and has elected to express support for the proposed AWACS mission at Tinker with the policy considerations for basis of official support being as follows:

1. The City Council has reviewed the Draft Environmental Statement for the AWACS Beddown at Tinker Air Force Base, and

2. The City of Midwest City has received notification thereby that a new mission designated AWACS has been proposed for Tinker Air Force Base, and

3. It is recognized that Tinker Air Force Base is a mainstay in the economic base for Midwest City and Central Oklahoma, and

4. The proposed AWACS mission will have a positive impact upon the local economy by causing the employment level at Tinker to increase by 750 jobs, and

5. Without the proposed AWACS mission at Tinker, the employment level would be reduced by an estimated 2,462 jobs, and

6. It is recognized that a positive economic impact upon the local economy will be caused by the $26.7 million input into Tinker for alteration of existing facilities and new construction to support AWACS, and

7. It has been determined in the Draft Environmental Statement that the principle adverse impact of the AWACS will be aircraft noise, and to a lesser extent accident hazard potential and air pollution, and

8. The impact of aircraft noise upon Midwest City is presently measured by the Air Installation Compatible Use Zone (AICUZ) being a study prepared by the Air Force without local consultation, advice, and input - - an untested and unproven study containing recommended guidelines which could have a negative and adverse impact upon the local community, and

9. The City Council has officially consulted with the Oklahoma Congressional Delegation and David O. Meeker, Assistant Secretary for Community Development, Department of Housing and Urban Development (HUD), during the time period of March 15 through 17, 1976, in Washington, D.C. and been advised that the recommended guidelines in AICUZ would not be implemented without further consultation, study, refinement, and local input, and

10. The local HUD office concurs with the posture of no implementation of the recommended AICUZ guidelines in accordance with the HUD Central Office in Washington, D. C., and

11. The Draft Environmental Statement has identified AICUZ as one of the "Unresolved Matters" concerning both the present and proposed mission of Tinker Air Force Base as the AICUZ relates to assessment of noise impact and Air Force land use recommendations, and

12. It has been determined that the accident hazard potential of Tinker aircraft operations related to Midwest City in the Clear Zone (to be owned in fee simple title by the U. S. Government) is 39%, in Accident Potential Zone I (the majority of which is being cleared by the Airport Clearance Project via the Oklahoma County Commissioners) is 7.9%, and in Accident Potential Zone II is 4.9%, and

13. The Draft Environmental Statement has determined that air pollutant emissions in the 1981 timeframe resulting from AWACS will be equivalent to approximately 0.5 percent or less of the regional emissions reported for 1970, and

14. The City of Midwest City has consistently acted in a manner indicating community support for the U. S. Air Force mission at Tinker Air Force Base and the objectives of national defense and security for which Tinker stands.

The above considerations were addressed by the City Council of Midwest City, Oklahoma, at their regular meeting of June 8, 1976, and official support for the proposed Beddown of AWACS at Tinker Air Force Base is affirmed as follows:

1. The City Council of the City of Midwest City, with a view toward the national security, expresses support for the Beddown of AWACS at Tinker Air Force Base as discussed above and as presented in the Draft Environmental Statement.

2. The City expresses the continued intent to cooperate in the best interest of the members of this community with the U. S. Air Force at Tinker to provide a suitable living environment within the corporate limits of Midwest City while providing for the protection and integrity of all necessary operations at Tinker Air Force Base.

On the authority of a unanimous motion of the City Council in favor of this official statement of policy, this statement is executed on the 8th day of June, 1976, by Marion C. Reed, Mayor, and attested by the City Clerk.

The City of Midwest City

By Marion C. Reed
MARION C. REED
Mayor

Attest:

Tommy Melton
TOMMY MELTON
City Clerk

CITY OF
DEL CITY
OKLAHOMA

Office of the
MAYOR

June 15, 1976

Department of the Air Force
Office of the Assistant Secretary
SAF/ILE (Billy E. Welch, Ph. D.)
Washington, D. C. 20330

Dear Dr. Welch:

This letter will convey the City of Del City's comments regarding the Draft Environmental Statement: AWACS Beddown at Tinker Air Force Base, Oklahoma.

Del City supports the proposed AWACS Mission at Tinker Air Force Base and sincerely hopes close cooperation between the City and Air Force continues in the future.

The City Council, Staff and I do wish to express serious concern with the AICUZ concept. We respectfully request detailed study in greater depth and close coordination with the communities adjacent to Tinker Air Base prior to consideration of adoption of AICUZ by any Federal Agency.

Recent City planning programs reflect a positive and active program of Community Development in Del City. We hope that positive attitudes regarding the AICUZ concept will be adopted by the Department of Housing and Urban Development, Environmental Protection Agency and Deparment of the Air Force.

Sincerely,

CITY OF DEL CITY

Carroll McIlvoy

Carroll McIlvoy
Mayor

cc: Oklahoma Congressional Delegation
Tinker Air Force Base Commander
Tinker Air Force Base Civil Engineer
Governor David Boren
Oklahoma State Senators and Representatives
David Meeker - HUD
Robert Breeden - HUD

PHONE 677-5741 P.O. BOX 15177 DEL CITY, OKLAHOMA 73115

RESPONSE TO LETTER

FROM

MAYOR, MIDWEST CITY (P. K-6, K-7)

23 JUL 1976

Dear Mayor Reed:

Thank you for your letter of June 11, 1976, in which you expressed the City's official support for the proposed AWACS mission at Tinker Air Force Base. As you requested, I have attached a copy of the public hearing transcript (Attachment 1). This transcript will appear in the Final Environmental Statement on the AWACS beddown with appropriate clarifications and further explanations in response to some of the questions.

I regret that our AICUZ study has become the subject of so much controversy. We believe that the analytical techniques used are sound and produce a reasonable portrayal of the impact of noise and accident hazard on existing and proposed uses for the land around Tinker Air Force Base. We recognize that communities may differ in their reaction to noise; however, we do hope that our proposals will receive serious consideration by local planning and zoning authorities in making master plan and zoning decisions. The Air Force does not seek to impose AICUZ concepts on any community, although we do see the need for collaborative action to minimize incompatible development around our installations.

Thank you for your interest in this matter. We would be glad to provide representatives to explain the AICUZ

analytical techniques and the reasons for the resulting land use recommendations to you and the City Council if you desire.

Sincerely,

(Signed)
BILLY E. WELCH
Special Assistant for
Environmental Quality

1 Attachment
Transcript

Honorable Marion C. Reed
Mayor, The City of Midwest City
Post Office Box 10570
Midwest City, Oklahoma 73110

APPENDIX L

LETTER FROM ENVIRONMENTAL

PROTECTION AGENCY

ENVIRONMENTAL PROTECTION AGENCY
REGION VI
1600 PATTERSON, SUITE 1100
DALLAS, TEXAS 75201

June 3, 1976

OFFICE OF THE
REGIONAL ADMINISTRATOR

PKE
PKP
(Ron)

Billy E. Welch, Ph.D.
Special Assistant for Environmental Quality
Office of the Assistant Secretary
Department of the Air Force
Washington, D. C. 20330

Dear Dr. Welch:

We have reviewed the Draft Environmental Impact Statement for AWACS Beddown at Tinker AFB, Oklahoma. The statement describes the proposed beddown of a new wing of E-3A, "AWACS" aircraft at Tinker AFB. By 1981 it is projected that a total of 34 aircraft will be assigned to Tinker of which 21 will operate in the Tinker AFB vicinity. Additional construction will be necessary at Tinker AFB to support this beddown.

We offer the following comments for your consideration in developing the Final Environmental Impact Statement:

L-1 1. Water quality data, including heavy metal analyses, should be included for Crutcho and Soldier Creeks. Our records indicate a request for an extention of the Compliance Schedule for the Tinker Field Industrial Wastewater Treatment Plant, as well as, violations of certain parameters which are listed in the discharge for the NPDES permit. The statement would be strengthened by discussing the major design improvements which would resolve the present difficulties in meeting the requirements of the industrial waste NPDES permit. The statement should also provide information on the potential effects to water quality which could result from this project.

L-2 2. Design capacity of the Southside Sewerage Treatment Plant is 25 mgd not 37.4 mgd as discussed in the statement. The plant is restricted by NPDES permit to an average daily flow of 13 mgd as opposed to the 27 mgd mentioned in the statement. The current, average daily flow from Tinker Field, as well as, the increased flow expected which could result from the project should be included in the statement. Local projections expect the Southside Sewerage Treatment Plant to exceed design capacity by 1981. The statement should expand on any agreements or contracts with Oklahoma City to accept the additional

sanitary sewerage which may come from this project. The statement should also contain analyses for heavy metals and standard tests on the raw sewage which is presently being transported by interceptor for treatment at the Southside Treatment Plant.

L-3 3. Up-dated information should be given in the Final Environmental Statement on methods and sites of disposal of hazardous materials and contaminated fuels and oils generated at Tinker. The hazardous waste site at Criner, Oklahoma is closed at this time and will not be available in the future.

L-4 4. Oklahoma City and Tinker AFB lie within the Central Oklahoma Air Quality Control Region which has been designated as Priority 1 for both particulate matter and hydrocarbon emissions. Tinker AFB's contribution of air pollutant emissions is not known (despite the data included in the draft EIS) due to their failure to submit sufficient data to this office for compliance determination. However, the emissions discharged from this facility are assumed to be substantial, particularly with reference to hydrocarbons and particulate matter. The question then arises as to how much Oklahoma City can bear concerning increasing hydrocarbon sources and still meet the state air regulations by 1980. Finally, the AF needs to pursue the problem of significant deterioration through a close analysis that considers environmental consequences on a proportional weighted basis with other factors borne by Oklahoma City. This, and the problem of following Oklahoma State Air Quality Control Regulations are primary concerns to be considered in the Final EIS.

These comments classify your Draft Environmental Impact Statement as ER-2. Specifically, we have reservations concerning possible project induced degradation of air quality and water quality. We are requesting that more emissions data on hydrocarbons and particulate matter be included along with information concerning disposal of hazardous materials. The classification and the date of our comments will be published in the Federal Register in accordance with our responsibility to inform the public of our views on proposed Federal actions, under Section 309 of the Clean Air Act.

Definitions of the categories are provided on the attachment. Our procedure is to categorize our comments on both the environmental consequences of the proposed action and on the adequacy of the impact statement at the draft stage, whenever possible.

We appreciate the opportunity to review the Draft Environmental Impact Statement and we will be happy to discuss our comments with you.

Please send us two copies of the Final Environmental Impact Statement at the same time it is sent to the Council on Environmental Quality.

Sincerely yours,

John C White

John C. White
Regional Administrator

Enclosure

ENVIRONMENTAL IMPACT OF THE ACTION

LO - Lack of Objections

EPA has no objections to the proposed action as described in the draft impact statement; or suggests only minor changes in the proposed action.

ER - Environmental Reservations

EPA has reservations concerning the environmental effects of certain aspects of the proposed action. EPA believes that further study of suggested alternatives or modifications is required and has asked the originating Federal agency to re-assess these aspects.

EU - Environmentally Unsatisfactory

EPA believes that the proposed action is unsatisfactory because of its potentially harmful effect on the environment. Furthermore, the Agency believes that the potential safeguards which might be utilized may not adequately protect the environment from hazards arising from this action. The Agency recommends that alternatives to the action be analyzed further (including the possibility of no action at all).

ADEQUACY OF THE IMPACT STATEMENT

Category 1 - Adequate

The draft impact statement adequately sets forth the environmental impact of the proposed project or action as well as alternatives reasonably available to the project or action.

Category 2 - Insufficient Information

EPA believes the draft impact statement does not contain sufficient information to assess fully the environmental impact of the proposed project or action. However, from the information submitted, the Agency is able to make a preliminary determination of the impact on the environment. EPA has requested that the originator provide the information that was not included in the draft statement.

Category 3 - Inadequate

EPA believes that the draft impact statement does not adequately assess the environmental impact of the proposed project or action, or that the statement inadequately analyzes reasonably available alternatives. The Agency has requested more information and analysis concerning the potential environmental hazards and has asked that substantial revision be made to the impact statement. If a draft statement is assigned a Category 3, no rating will be made of the project or action, since a basis does not generally exist on which to make such a determination.

L-1 Water Quality Data for Crutcho and Soldier Creeks are as follows:

	E Soldier*	W Crutcho	E Crutcho
COD	42	49	20
CN	.005	.0025	.005
Phenols	.80	<.022	.13
Cd	.03	<.01	.005
Cr	.11	.03	.29
Cu	.54	.03	.04
Cr+6	<0.01	.03	.018

*All values are in (mg/l)

The change in the Compliance Schedule for Tinker AFB is not for the Industrial Wastewater Treatment Plant. The NPDES Permit allows eight separate discharge points of which the Treatment Plant is one. There is a Military Construction Program (MCP) project which will eliminate the remaining seven points by connecting them to the industrial waste collection system. The change in the compliance schedule was to allow for the lead time needed for MCP projects.

The beddown of AWACS aircraft at Tinker AFB would have no effect on the water quality since all facilities will be connected to the industrial waste system. Depot level maintenance will not tax the treatment plant capability as it is now operating at about 50% of capacity.

L-2 Design capacity and average flow of the Southside Sewerage Treatment Plant were corrected on page 97.

The current average daily flow from Tinker AFB is .5 mgd. If all proposed housing due to AWACS is constructed on the base the average daily flow would be .77 mgd. The current Tinker AFB sewage contract allows for an estimated daily flow of .92 mgd. The actual daily flow with the AWACS mission included would be far less than already estimated in the current contract.

Sewage transported to the Southside Plant contains only the sewage collected in sanitary sewage mains. Industrial wastewater is routed through the industrial waste collection system.

L-3 Disposal of hazardous materials generated at Tinker AFB will be in accordance with Federal and state regulations. Currently a temporary waiver has been given by the Oklahoma State Health Department to allow disposal at certain designated sites. As the situation changes, Tinker AFB will comply with the regulations.

L-4 Tinker AFB contribution of air pollutant emissions is now known. The base submitted completed OMB form 158, Compliance Status Air Emission Inventory, to the Environmental Protection Agency, Region VI, on 15 June 1976. To further definitize the air pollutant emissions, the Air Force Civil Engineering Center (AFCEC) is currently modeling the base using a computer program and the resulting product will aid in determining Tinker's contribution to regional air quality. The final report will be made available to all interested agencies when the study is completed (projected, Spring 1977).

In order to assist in minimizing the air quality impact under adverse meteorological conditions, Tinker AFB, in concert with local authorities, has prepared an air pollution alert episode plan. This Plan identifies various base activities which can be curtailed under different air alert stages.

Regarding the statement that the Air Force should pursue the problem of significant deterioration through a close analysis, the regulation concerning the significant deterioration of ambient air quality, FR 40 CFR 52, dated December 5, 1974, applies only to 18 classes of new stationary sources, none of which are involved in the AWACS beddown. Also, these requirements are aimed at controlling particulate matter and are not aimed at controlling the hydrocarbon levels.

Recognizing its pollutant contribution to the region, Tinker AFB constantly strives to achieve compliance with all applicable standards. The data submitted to the EPA, and the AFCEC study mentioned above, will assist in determining current emissions levels. In addition, two projects to control the level of pollutant emissions have been recently completed (Install Tank Vents and Replace Incinerator), which will help reduce the amount of pollutants generated by the base.

APPENDIX M

LETTER FROM DEPARTMENT OF

HEALTH, EDUCATION AND WELFARE

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
REGIONAL OFFICE
1200 MAIN TOWER BUILDING
DALLAS, TEXAS 75202

OFFICE OF
THE REGIONAL DIRECTOR

June 14, 1976

Our Reference: EI# 0176-687
AWACS, Tinker AFB, Oklahoma

DCS/P&R
Asst DCS
Executive
Asst Exec D
Asst Exec
Action PRE
Susp
Info PRP
(Dwn)

Department of the Air Force
SAF/ILE
ATTN: Billy E. Welch, Ph.D
Special Assistant for Environmental Quality
Washington, D. C. 20330

Dear Dr. Welch:

Pursuant to your request, this office has completed a Departmental review of the Environmental Impact Statement in accordance with the provisions of Section 102(2)(C) of P.L. 91-190 and the Council on Environmental Quality Guidelines of April 23, 1971.

Environmental health program responsibilities and standards of the Department of Health, Education, and Welfare include those vested with the United States Public Health Service and the Facilities Engineering and Construction Agency. The U.S. Public Health Service has those programs of the Federal Food and Drug Administration (milk, food, interstate travel and shellfish sanitation) and of the Health Services and Mental Health Administration, which include the Bureau of Community Environmental Management (housing hygiene, injury control, recreational health, and insect and rodent control) and the National Institute of Occupational Safety and Health.

Attached are comments and reactions to the Environmental Statement made by departmental agencies concerned with environmental health aspects of the project.

We thank you for the opportunity to coordinate our mutual environmental interests as they relate to this project proposal.

Sincerely,

D. Dean Blue

D. Dean Blue, P. E.
Regional Environmental Officer
Facilities Engineering and Construction

Enclosures

DEPARTMENT OF HEALTH, EDUCATION AND WELFARE

Reaction Review and Comments on Environmental Impact Statement for Project Proposal:

Draft Environmental Impact Statement Reviewed with Objections [ ]

Draft Environmental Impact Statement Reviewed with No Objections [X]

Date: JUNE 9, 1976 EI#: 0176-687

Agency/Bureau: DHEW/PHS

Project Proposal: "AWACS BEDDOWN AT TINKER AFB, OKLAHOMA"

Comments: THIS REGIONAL OFFICE CANNOT CONDONE ANY INCREASE IN A HEALTH PROBLEM WHERE DATA SHOW EXISTING CONDITIONS AS EXCEEDING ESTABLISHED STANDARDS. THE RESPONSIBILITY FOR INSURING THE HEALTH AND SAFETY OF THE AFFECTED POPULATIONS, MILITARY PERSONNEL AND THEIR DEPENDENTS, CIVILIANS EMPLOYED BY THE MILITARY, AND OTHER LOCAL CITIZENS (PARTICULARLY IN MIDWEST CITY) RESTS WITH THE AIR FORCE. COOPERATIVE EFFORTS ARE UNDERWAY TO SOLVE MIDWEST CITY DEVELOPMENT PROBLEMS.

RESPONSE TO

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE

REGIONAL OFFICE

(LETTER 14 JUN 1976)

No comment required.

APPENDIX N

LETTER FROM STATE OF OKLAHOMA

STATE GRANT-IN-AID CLEARINGHOUSE

STATE OF OKLAHOMA
State Grant-In-Aid Clearinghouse

5500 N. WESTERN • OKLAHOMA CITY, OKLAHOMA 73118 • PHONE (405) 840-2811

May 25, 1976

Mr. Billy Welch, SAF/ILE
United States Air Force
Washington, D. C. 20330

RE: 03E608 - Tinker AWACS Beddown

Dear Mr. Welch:

The environmental information for the above referenced project has been reviewed in accordance with OMB Circular A-95 and Section 102 (2) (C) of the National Environmental Policy Act by the state agencies charged with enforcing environmental standards in the State of Oklahoma.

The state agencies, comprising the Pollution Control Coordinating Board, have reviewed the proposed project and agree that no adverse environmental impact is anticipated. Therefore, the state clearinghouse requires no further review.

Sincerely,

Don Strain

Don N. Strain
Director

DNS:mt
cc: ACOG

RESPONSE TO

STATE OF OKLAHOMA

STATE GRANT-IN-AID CLEARINGHOUSE

(LETTER 25 MAY 1976)

No comment required.

APPENDIX O

LETTER FROM THE MIDWEST CITY-DEL CITY BOARD OF REALTORS, INC.

Midwest City-Del City Board of REALTORS, Inc.

REALTOR®

June 11, 1976

Department of the Air Force
Office of the Assistant Secretary
SAF/ILE (Billy E. Welch, Ph.D)
Washington, D. C.

Attention: Billy E. Welch, Ph.D
Special Assistant for Environmental Quality

Re: Comment on
"Draft Environmental Statement=AWACS Beddown at Tinker Air Force Base=Oklahoma"

Dear Mr. Welch:

The above "Draft" was considered by The Midwest City-Del City Board of Realtors at their regular monthly meeting. On the strength of a unanimous motion adopted by members of the Board, I must advise you official support was expressed for the proposed AWACS Mission in view of the positive economic impact that AWACS will have upon the local economy and housing industry. I must also advise you however, that the Midwest City-Del City Board of Realtors also expressed an official unanimous statement of opposition to the Air Installation Compatible Use Zone Study (AICUZ). AICUZ is considered to be unrealistic in its recommendations and a study which is not founded upon local facts nor was it formulated with local community input.

If you should seek additional input from the affected communities on this subject please do not neglect to contact the Midwest City-Del City Board of Realtors or any of its members. Again, we as a Board do unanimously support AWACS, however we are unanimously opposed to AICUZ!

Sincerely,

Norma Saulsberry

Norma Saulsberry, President
Midwest City-Del City Board of Realtors

(405) 737-3023 ● Post Office Box 10695 ● Midwest City, Oklahoma 73110

RESPONSE TO

MIDWEST CITY - DEL CITY BOARD OF REALTORS, INC

(LETTER 11 JUN 1976)

No comment required.

APPENDIX P

LETTER FROM UNITED STATES DEPARTMENT OF THE INTERIOR

United States Department of the Interior

OFFICE OF THE SECRETARY
SOUTHWEST REGION
Room 4030, 517 Gold Avenue SW.
Albuquerque, New Mexico 87101

ER-76/429

June 16, 1976

Dr. Billy E. Welch
Special Assistant for Environmental Quality
Office of the Assistant Secretary
Department of the Air Force
Washington, DC 20330

Dear Dr. Welch:

This responds to your request for the Department of the Interior's review and comment of the draft environmental statement for the proposed AWACS Beddown at Tinker Air Force Base, Oklahoma County, Oklahoma.

Overall, we believe that the draft statement adequately describes the impacts of the proposed development on the environment. The following are some specific comments you may wish to consider in preparation of the final statement.

Page 110, Item 3.4.10.3 Archeological Sites at Tinker Air Force Base

The environmental statement is inadequate in its consideration of archeological resources. The proposed construction areas should be inspected by a professional archeologist to determine the presence or absence of archeological resources. The final environmental statement should note that such a survey was made and should cite the name and institution of the investigator. If no archeological sites were evident, it should be so stated. If sites were recorded, there should be information regarding the nature and significance of the sites and the effect of the project on such sites. If the project will adversely affect significant archeological resources, then there should be a plan of action cited to mitigate this effect.

Page 185, Item 4.6.2 Impact on Non-point Runoff from the Proposed Family Housing

The proposed 450 housing units would change the surface of about 50 percent of the 70-acre housing site to impervious area. This would increase the impervious area in Crutcho Creek basin above Vandenberg Street from 3 to 7.7 percent (par. 3 and 4), and according to computations shown in Appendix F would not

significantly increase peak flows in Crutcho Creek below the site. However, if other parcels of land in the basin become similarly urbanized, the cumulative effect on peak flows would soon become large, even though the contribution from any one parcel might be small. To ignore the small increase due to this project might be acceptable if it were the final change to impervious conditions in the basin. If it is not, measures to mitigate the peak flow increases should be considered for this project.

Sincerely yours,

Raymond P Churan

for Willard Lewis
Special Assistant to the Secretary

P-1 The following letter from the Oklahoma Archaeological Survey indicates that there will be no impact on the archaeological resources of the area.

The
University of Oklahoma 1335 South Asp Avenue Norman, Oklahoma 73069

Oklahoma Archaeological Survey

July 19, 1976

Major Robert Deluca
2854 Air Base Group/DEEV
Tinker Air Force Base, Oklahoma
73145

Dear Major Deluca:

The information communicated to the Arthur D. Little Company was derived from a 1972 reconnaisance survey of the drainages of Crutcho and Soldier Creeks, by Mr. David Lopez, and a survey in 1972 of the proposed Arcadia Reservoir by Larry Neal. The first survey actually included the drainages on Tinker Air Base and it was determined then that the Base was clear of any prehistoric archeological remains. Use of the information in the Archeological Resource files at the Oklahoma Archeological Survey and the two referenced surveys also provided a means to evaluate the probability of archeological sites occurring in areas on or adjacent to the Base. This data suggests that the physiographic situations preferred by prehistoric inhabitants of the cross timbers area was not present within the undisturbed sections of the Air Base.

The project in question, the Airborne warning and Control System (AWACS) is to be constructed in an area previously disturbed by construction. Consequently, based on the information from the files search, previous surveys, and past land use, it was determined that there should be no impact on the archeological resources of the area.

I hope this information will satisfy your requirements. If the Survey can be of further help to you, please contact us.

Sincerely,

Larry Neal

Larry Neal
Assistant State Archeologist

WLN:elr